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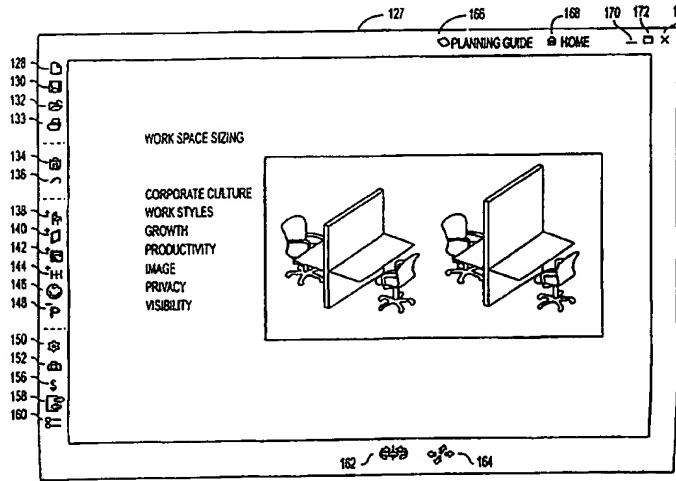
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(71) Applicant (for all designated States except US): HAWORTH, INC. [US/US]; One Haworth Center, Holland, MI 49423-9576 (US).		
(72) Inventors; and		Published
(75) Inventors/Applicants (for US only): SMITH, Ward, W. [US/US]; 911 West Cavanaugh #10, Lansing, MI 48910 (US). ELLIS, John, M. [US/US]; 99 Sunrise Drive, Holland, MI 49423 (US). McNUTT, Michael, P. [US/US]; 1355 Union N.E., Grand Rapids, MI 49505 (US). SCHOEPPE, Renee, E. [US/US]; 2450 Chassell S.W., Wyoming, MI 49509 (US).		With international search report.
(74) Agents: LAZAR, Dale, S. et al.; Cushman Darby & Cushman, Intellectual Property Group of Pillsbury Madison & Sutro, 1100 New York Avenue, N.W., Washington, DC 20005 (US).		

(54) Title: GRAPHICAL USER INTERFACE SUPPORTING METHOD AND SYSTEM FOR REMOTE ORDER GENERATION OF OFFICE FURNITURE PRODUCTS



## (57) Abstract

A graphical user interface to a method and system for configuring office furniture includes interface objects for obtaining configuration criteria from a user; presenting the user with at least one typical configuration satisfying the criteria; selecting a typical configuration from the at least one typical configuration; modifying aspects of the selected typical configuration to produce a modified configuration; and checking the validity of the modified configuration. The configuration criteria include conferencing criteria; privacy criteria; power criteria; communications criteria; storage criteria; and area criteria. A typical configuration can be modified by adding, deleting, or repositioning a component, changing the fabric or finish or the shape or size of the component. A cluster configuration based on the typical configuration is formed. The entire product line can be changed. At any time the entire typical or cluster configuration can be checked for validity and priced.

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GRAPHICAL USER INTERFACE  
SUPPORTING METHOD AND SYSTEM FOR REMOTE ORDER  
GENERATION OF OFFICE FURNITURE PRODUCTS

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**BACKGROUND OF THE INVENTION**

**1. Reservation of Copyright**

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**2. Field of Invention**

This invention relates to graphical user interface supporting a method and system for enabling the selection and configuration of complex furniture products. More specifically, this invention relates to enabling the selection and configuration of three-dimensional office furnishing products so as to enable remote order generation of valid and acceptable configurations of those products.

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### 3. Description of Background Information

The sale process for complex products, that is, products that are made up of many interconnected parts, is notoriously difficult, especially when customers are given configuration and product-line choices.

For example, in the office furniture industry, the goal of the sale process is to provide the customer with an acceptable furniture configuration within the customer's price limitations.

From the customer's perspective, an acceptable configuration is one which will provide workspace for their employees within various work-related and space criteria set by the customer. For example, a customer may need to provide, in a given area, sitting work space for a thousand people, where all people have acoustic privacy. A customer's criteria may be complex and often the customer does not really know what they are, other than to know the number of people and the space they will go into.

From the manufacturer's perspective, an acceptable configuration is one which can be manufactured from the manufacturer's product line. That is, an acceptable configuration is a valid, manufacturable configuration of existing component parts.

The sales process is essentially an attempt to reach a convergence on a configuration which is

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acceptable to the customer (meets all space, price and other requirements) and which is acceptable to the manufacturer (is a valid configuration which is manufacturable).

5 An office workspace configuration may comprise thousands of parts drawn from an inventory of millions of possible parts. Each workspace may comprise dividing walls or side panels, work surfaces, storage areas, support structure, electrical structure and the like. Even for a given configuration of workspace, there are various qualitative and quantitative options available. Each part may be available in various qualities and in various colors. Some of the parts may not be compatible with parts from other product lines 10 of the same or other manufacturers. Further, any choice made, even for a single part, may affect the entire configuration.

15

A customer wishing to buy a complex product such as office furniture is faced with an incredible number of interdependent choices.

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In the office furniture market at present, a typical sale takes place as follows: A salesperson visits a customer and presents the customer with drawings of some typical configurations of various product lines. The customer selects various options 25 which the salesperson records. At this time all of the

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sale is taking place in terms of individual parts and not in terms of the final product or even in terms of compound components of the final product. In other words, the customer does not buy a collection of workstations, instead he buys a collection of parts.

Once the customer is satisfied with the configuration, the salesperson goes back to the manufacturer who determines whether or not the configuration is actually possible given the current product line. For example, the customer may have put a shelf on a dividing panel without confirming that the panel could actually support such a shelf. Or a panel may be given a size which the manufacturer does not or cannot manufacture. Accordingly, the manufacturer then tries to build the customer's proposed order using a CAD (computer aided design) system and a collection of known parts. Errors in the customer's proposed order are reported and, in some cases, a best attempt at the order is drawn up. From this best attempt produced by the CAD operators, a list of required component parts is obtained and then a price for the entire configuration is determined for all of the component parts.

This process, so far, can take more than two weeks. The sales person then goes back to the customer with the design, as best it could be done, and the

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price for this design. This is the first time that the customer sees his actual order drawn out, and usually in two-dimensions. If there were errors in the design, which there usually are, or if the customer does not like the current design, the process is repeated.

After some number of iterations (that is customer to sales person to CAD operator to pricing and back to the customer via the sales person), the customer is finally presented with an acceptable configuration and a price for that configuration.

In a typical sales scenario this whole order process (i.e., convergence to a configuration which is acceptable to both the customer and the manufacturer) takes six sales calls and design iterations.

Even when the customer is satisfied with a configuration and even if it is a valid, manufacturable configuration, there is no simple way for anyone to go back and ask a simple "what if" type of question about the order. For instance, if, in an order for an acceptable configuration, the customer wants to know the effect on price of changing to a different quality panel system, the whole price would have to be redetermined by the manufacturer.

To see why this pricing and configuration process is not simple, consider the change from a high quality panel to a lower quality panel of the otherwise same

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dimensions. Suppose that the panel has a shelf hanging on it and that the high quality panel can support shelves whereas the lower quality panel cannot support shelves without an extra support. So, a supposedly simple question like "What if I use this type of panel instead of that?" can lead to an entire reconfiguration and repricing of the system. It's often not enough to just change the price of the components being used, sometimes the components themselves have to be supplemented. In some cases, changes may not be possible.

Even from a salesperson's perspective, the inability to price "what if" scenarios has major drawbacks. For instance, if a customer is satisfied with a configuration's layout but still thinks that the price is too high, it is desirable for the salesperson to be able to make qualitative changes to the configuration and show what the corresponding price changes would be. In the case of office furnishings, a salesperson would like to be able to show, at the customer's site and at the time of setting up the configuration, the effects on price of various changes. In that way, convergence to an acceptable configuration can be achieved with greater speed.

In the general field of product configuration, tools have been developed to aid in selection and

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validation of configurations. One such system is available from Trilogy Development Group of Austin, Texas, and is described in United States Patent No. 5,515,524, "Method and Apparatus for Configuring Systems," to Lynch et al, which is expressly incorporated herein by reference in its entirety.

Lynch describes a constraint based configuration system using a structural model hierarchy. The structural aspects of the model provide the system with the ability to define a model element as being contained in, or by, another model element. The structural model provides the ability to identify logical datatype and physical interconnections between elements and to establish connections between elements.

In order to configure a product, Lynch's system accepts input in the form of requests or needs. Using this information, Lynch's system configures a system by identifying the resource and component needs, constraints imposed on or by the resources or components identified, and the structural aspects of the system.

In the specific area of office furniture configuration, attempts have been made to provide customers with simple CAD systems with which to design their configurations. The problems with these systems include that they are difficult to use, they are

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inaccurate, they do not provide the customer with a way  
to determine whether or not he has a valid,  
manufacturable configuration (so the customer still has  
to go back to the manufacturer to have configurations  
manually checked), and they do not have any knowledge  
of the manufacturer's product line. Further, no  
proposed systems are able to prepare a configuration  
and provide a price for that configuration.  
5

10

#### SUMMARY OF THE INVENTION

It is an object of this invention to provide an  
order generation system, preferably a remote order  
generation system.

15

It is a further object of this invention to  
provide sales people and customers with product  
configuration systems that are easy to use, accurate,  
provide the customer with some way to determine whether  
or not he has a valid, manufacturable configuration (so  
that the customer does not have to go back to the  
manufacturer to have configurations checked each time  
they change), and that has knowledge of the  
manufacturer's product line. It is a further object of  
this invention to provide a system that is able to  
prepare a configuration and that is also able to  
20

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provide a price for that configuration.

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It is also an object of this invention to provide a system that can have product line and price information added and modified.

It is also an object of this invention to provide  
5 a system that generates visual specification in two-dimensional (2-D) and three-dimensional (3-D) rendered images.

Accordingly, in one aspect, this invention provides a graphical user interface to a computer program for configuring and ordering office furniture.  
10 The user interface presents a user with various selectable options, via display screens on a monitor. Depending upon which options the user selects, the graphical user interface provides the user with  
15 information about the product selected or gets input from the user about his requirements.

The user can interact with the order generation program via the user interface to select a basic configuration of furniture, modify the configuration,  
20 create a cluster derived from the basic configuration. At all times the user is able to ensure that the current configuration is valid (i.e., manufacturable and/or within the product line) and the user is able to obtain price information about the configuration.

25 The system takes as input user criteria such as conferencing criteria; privacy criteria; power

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criteria; communications criteria; storage criteria; and area criteria.

The user, via the user interface, can modify a configuration by adding, deleting or moving components in the configuration or by changing the size or shape of a component of the configuration. When the shape or size of a component is adjusted, it can only be changed to a valid shape or size, thereby maintaining the integrity of the displayed furniture configuration.

Generally, at any stage of the furniture configuration, the user is able to obtain a realistic display of the configuration and is then able to view that display from arbitrary view points.

Thus, in one aspect, this invention is a graphical user interface, a method for using the graphical user interface, or a method of configuring office furniture. In another aspect, this invention is computer-readable media tangibly embodying an interface program of instructions executable by the machine to provide a graphical user interface to a computer program for configuring office furniture.

#### BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features, and advantages of the present invention are further described in the detailed description which follows,

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with reference to the drawings by way of non-limiting exemplary embodiments of the present invention, wherein like reference numerals represent similar parts of the present invention throughout the several views and  
5 wherein:

FIGURE 1 depicts a typical computer system on which the order generator of this invention operates;

10 FIGURE 2 shows the architecture of a preferred embodiment of the order generator according to this invention;

FIGURE 3 shows the architecture of an alternative preferred embodiment of the order generator according to this invention;

15 FIGURE 4 is a flowchart of the operation, from a user's perspective, of the order generator of the present invention; and

FIGURES 5-15 depict various interface displays of the order generator of the present invention during its operation.

20

#### DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EXEMPLARY EMBODIMENTS

This invention operates on a typical computer system 100 such as shown in FIGURE 1. The computer system 100 includes various input devices 102 such as a keyboard, as well as a pointer device 104. A mouse,  
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track ball, touch screen, keyboard cursor control keys or the like can be employed as the pointer device 104. The computer system 100 also includes a processor such as CPU 106 and internal memory 108. The processor 106 may be a special purpose processor with image processing capabilities or it may be a general purpose processor. The memory 108 may comprise various types of memory, including RAM, ROM, and the like. The computer system 100 also includes external storage 112 which includes devices such as disks, CD ROMs, ASICs, external RAM, external ROM and the like.

The present invention can be implemented as part of the processor 106 or as a program residing in memory 108 (and external storage 112) and running on processor 106, or as a combination of program and specialized hardware. When in memory 108 and/or external storage 112, the program can be in a RAM, a ROM, an internal or external disk, a CD ROM, an ASIC or the like. In general, when implemented as a program or in part as a program, the program can be encoded on any computer-readable medium or combination of computer-readable media, including but not limited to a RAM, a ROM, a disk, an ASIC, a PROM and the like.

The computer system 100 also includes a display 110 and, optionally, an output device such as a printer 113.

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The computer system 100 can run any operating system.

In preferred embodiments, the computer system 100 is an IBM PC compatible notebook computer configured 5 with a Pentium 90 (or above) CPU (for processor 106) and, (for memory 108) a minimum of sixteen Mbytes RAM, a CD drive and a hard drive with 840 Mbytes, with approximately thirty Mbytes of free disk space (for external storage 112). The computer system 100 10 preferably runs Microsoft Windows 95 as its operating system.

The preferred display 110 is an 800 x 600 active color matrix display with sixteen-bit color. The preferred printer 112 is at least an ink jet color 15 printer.

While the preferred computer system is a stand-alone system, in other embodiments the computer system 100 is connectable to a network of computers so that some or all of its processing functions, for example, 20 for complex tasks, can be off loaded to other computers on the network. In network environments some or all of the data may reside at remote locations.

The architecture of a preferred embodiment of the order generator is shown in FIGURE 2 wherein the order generator 114 uses a modelling tool 116 connected to a 25 custom user interface 118. Both the modelling tool 116

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and the custom user interface 118 access (read and/or write) various databases, including a product attribute database 120. The user interface 118 also accesses a meta file 121 which it uses to share data through a symbol library 123 with a CAD package 124.

The modelling tool 116 takes as input various user configuration specifications via the custom user interface 118, verifies their validity and determines their pricing. This information can be passed back to the custom user interface 118 or it can be used by a project specifier 122, in conjunction with the CAD package 124, to produce an actual order 125. The project specifier 122 also takes input from a product catalog 129 in order to produce the actual order 125.

In one aspect, the custom user interface 118 operates as a front-end to the modelling tool 116, providing it with user requirements, user specified furniture configurations and other information and obtaining from it configuration information including whether or not a configuration is valid and the price of the configuration.

Preferably the modelling tool 116 is one which uses a generative approach for configuring systems. Such a system is available from Trilogy Development Group of Austin, Texas, and is described in United States Patent No. 5,515,524, "Method and Apparatus for

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Configuring Systems," to Lynch et al, already incorporated by reference herein in its entirety.

Lynch's system, in order to configure a product, accepts input in the form of requests or needs. Using 5 this information, Lynch's system configures a system by identifying the resource and component needs, constraints imposed on or by the resources or components identified, and the structural aspects of the system.

10 Thus, in the present invention, the modelling tool 116 is programmed to configure office furniture systems by identifying the component needs, resources, and constraints imposed on or by the resources or components identified, and the structural aspects of 15 the system. For example, a particular storage requirement may require a certain type of panel. If a user requires that type of storage then the appropriate type of panel must be used.

The model can handle both configuration and 20 checking functions. In the preferred embodiment, three-dimensional objects and their topological relationships are modelled. The attributes modeled include, but are not limited to:

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size (x, y, z dimensions);  
25           color; . . .  
           texture;
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finish (fabric/direction, wood/direction,  
laminate, glass, metal);  
obsolescence;  
power (electric); and  
weight.

5                 The modelling system 116 can connect workstations,  
recognize and fix common walls, resolve component  
duplication and overlap, indicate obstacles and resolve  
power connectivity. For example, with regard to panel  
10                 connectivity, angles are confined to a limited number  
of fixed positions. As to common walls, from a two-  
dimensional representation of a layout, the system  
ensures that the correct number of parts is calculated.

15                 The modelling system 116 bases its determinations  
on the input user requirements and on information in  
the product attribute database. It also uses a model  
of the inter-relationships between the various  
components. An example of such a model is shown in the  
tables appearing at the end of this specification.

20                 In an alternate embodiment of the order generation  
system 115, as shown in FIGURE 3, the functions of the  
project specifier are incorporated into the modelling  
tool 116 and there is tight coupling of the modelling  
tool to a CAD program. In this embodiment of the order  
25                 generation system 115, there are two integrated

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interfaces to the modelling tool 116, namely a custom user interface 124 and a custom design interface 126.

#### System Operation

5           The operation of the order generation system 114, particularly the custom user interface 118, on computer system 100 is now described with reference to FIGURES 1-15. The custom user interface 124 of the alternative embodiment 115 shown in FIGURE 3 operates in the same 10 manner.

When the order generation system 114 begins running on computer system 100, the user is presented with a start screen on the display 110 of computer system 100 (at P100 in FIGURE 4). The start screen presents the user with various user selectable options. The options are presented as demarcated text areas or as icons on the screen depicted on the display 110 of the computer system 100. Each presented option can be selected with the pointer device 104 or using one or more keys on the keyboard 102. An option is selected 20 in a known manner such as by clicking the pointer device 104 on the area of the screen on which the option is displayed.

When an option is selected, the custom user interface 118, running on computer system 100, determines which option has been selected and then

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either processes the option or effects processing of that option. For example, some options are processed entirely within the user interface 118 itself, whereas others require processing by other components of the system 114, in particular by the modelling tool 116.

5

Generally the custom user interface 118 keeps

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track of user information at a project level. For each project the custom user interface 118 gets information from the user and then tracks and stores that information as needed. The information is tracked and stored in a manner known in the art such as in a data structure or database which can be accessed as needed.

15

When the user interface 118 requires information regarding product attributes, it obtains that information from the product attribute database 120.

20

When, as the result of some implicit or explicit user request, the user interface 118 requires some processing to be performed by the modelling tool 116, the user interface 118 invokes the appropriate

25

functionality of the modelling tool 116 and gives the modelling tool 116 whatever data is needed. For example, if, as will be described below, the user requests, via the user interface 118, that the modelling tool 116 check the validity of a furniture configuration, then the user interface 118 will pass to the modelling tool 116 the appropriate data

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representing the current configuration. Using the data it receives about the configuration from the user interface 118, along with whatever information it needs from the product attribute database 120, along with the model of the system, the modelling system will then, as requested, check the configuration of the configuration. The result of the configuration check by the modelling tool 116 is not simply a binary "valid" or "invalid" result, but, when possible, is a valid configuration. Thus, the modelling tool 116 is able to pass back configuration data to the user interface 118.

From the start screen presented to the user by the user interface 118, the user is given the option of either loading an existing project (i.e., a project which was previously saved by the order generation system 114) (at P102), or beginning a new project (at P104). If the user selects the option to open an existing project, then the order generation system 114, via the user interface 118, prompts the user for the name under which that project was saved. If the named project can be found, the order generation system 114 retrieves the project and loads it into the system, otherwise the user is prompted for another project name or to start a new project.

- 20 -

If the user selects the option to create a new project (at P104), then the user is prompted (at P106) to input the needs of the project on a series of planning guide screens. Based on the user's input into the planning guide screens, the order generation system 5 114 determines which options to present to the user in subsequent display screens.

For example, the user interface 118 compiles or translates the entered user requirements into criteria which both it and the modelling tool 116 can use. 10 Then, when requesting a list of components which meet the user's needs, the user interface and, when necessary, the modelling tool 116, can query the requirements to ensure that they are met.

One example of such a use would be if the user's 15 needs included standing privacy and lockable storage space. Then, as described below, when the user requested a list of typical configurations satisfying his needs, those which did not provide standing privacy and lockable storage would be excluded. 20

The various planning requirements (user needs) for 25 which the user is prompted include, but are not limited to, privacy requirements, storage requirements, conferencing criteria, electrical/computer space and connection requirements, space requirements, budget constraints, lighting requirements and types of use.

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As to privacy options, the user is given the option of specifying the privacy requirements in terms of panel heights or in terms of various types of privacy: "seating privacy", "standing privacy",  
5 "acoustic privacy" and the like. If the user selects certain types of privacy, the order generation system 114 translates this selection into a panel height selection. In preferred embodiments the user is presented with images such as shown in FIGURE 5 in order  
10 to explain the various privacy options.

Preferably the planning guide consists of a series of forms which are graphically displayed on the screen, each form having a number of options. Once the user selects a particular option, a screen for that option  
15 is displayed with questions about the various sub-options. For example, in order to determine the user's storage requirements, the user selects a storage requirements option and is presented with a storage requirements screen. As shown in FIGURE 6, this screen includes pictures of various types of storage along  
20 with textual descriptions of the items which can be stored in each kind of storage.

In some embodiments the user is also provided with an optional tour through a virtual showroom. This tour  
25 would consist of a multimedia (e.g., Quicktime etc.) tour through a showroom demonstrating the various

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product lines available and various configurations of those products.

Once the user has completed the planning (at P106) or opens an existing project (at P102) the order generation system 114 provides the user with various options described below. In general, navigation in the order generation system 114 is non-modal. That is, any display screen can be reached from any other display screen and user selected instructions or operations (at P108) are performed (at P110), in effect, either by the user interface 118 or by some other part of the order generation system 114 such as the modelling tool 116. Generally, when a user selects an instruction, the order generation system 114 running on computer system 100 performs that instruction. Preferably the user interface 118 performs as many functions as it can, passing requests to the modelling tool 116 only as needed.

Thus, as shown in FIGURE 7, each display screen 127 includes various user selectable icons (128-174). Preferably, the icons (128-174) are grouped and positioned on the screen 124 according to their type of functionality. For example, icons 128-133 relate to project maintenance (saving and restoring) and printing functions; icons 134 and 136 relate to editing functions; icons 138-160 relate to configuration and

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customization functions; icons 162 and 164 relate to image positioning and moving functions; planning guide icon 166 relates to the planning guide functionality (described above) and the home icon 168 returns the user to the start (or home) display screen. The window control icons 170-174 are used to size and position the display screen 126 on the display 110.

When the user selects (by clicking on it with the pointer device 104) the new project icon 128, then the user is prompted for the name of the new project and a new project is created.

When the user selects the save project icon 130, the order generation system 114 saves the current project to a storage device connected to the computer system 100. The user has the option of changing the name of the project when it is saved.

When the user selects the open project icon 132, the user is prompted for the name of the project to be opened. If the project of that name is found then it is opened and replaces the current project in the order generation system 114.

When the user selects the print icon 133, then the user interface 118 prints the current project.

When the user selects the delete icon 134, then the order generation system 114 deletes the current

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selection (on the display). The undo icon 136 is used to undo previous deletions.

The configuration icons 138-148 are now described in greater detail.

5 By selecting the new typical icon 142, the user is able to select a typical workstation configuration which satisfies the user's requirements input in the planning stage (at P106).

10 When the user selects the new typical icon 142 a graphical depiction of various typical workstation configurations 180 is displayed on the screen. Each of these displayed typical configurations should satisfy some of the user's requirements, at least with regard to privacy, work area and electrical connectivity. 15 Price and space requirements cannot always be satisfied until a complete clustered configuration is determined.

20 The user can select one of the displayed typical workstation configurations by clicking on it with the pointer device 104. The selected typical configuration is highlighted and displayed on the screen (at 182).

25 The system is pre-configured with a number of so-called typical configurations, and preferably the typicals displayed on the typical screen are those which satisfy the customer's criteria entered at the customer needs screen (reached by selecting the planning guide icon 166).

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Once the user has selected the typical configuration that is to be used, the user can then double click with the pointer device 104 on the depiction of that typical in order to view it and operate on it. At that time the order generation system 114 displays a three-dimensional view of the selected typical on the screen on display 110 (FIGURE 8). Preferably the selected typical furniture configuration is displayed with the appropriate colors and textures.

With reference to FIGURE 8, the user can rotate and move the selected depicted typical workstation using the zoom icon 162 and the move icon 164, respectively. The depiction of the workstation can also be moved and rotated using the pointer device positioned on the object and then moved around the screen area. In this way the user can view the workstation from various angles and positions.

Preferably the image is displayed in a selected color and with a selected texture, that is, in the color and texture of the actual product. Selection of color and texture will be described below.

At any time, the typical configuration displayed on the screen can be modified by the user. This modification can be in the form of adding or removing

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components, changing the shape, size or color of a component or changing the properties of a component.

While viewing a configuration, the user can select product options. In order to pick product options, the 5 user points and clicks the pointer device on the select material icon 148 on the screen 126. This causes the computer 100 to display the various materials screen on the display 110.

The properties screen allows the user to specify a 10 workstation at a detailed level. Every attribute of every part in the workstation can be selected to create a customer's configuration which is then displayed on the screen. The system only allows a user to select valid attributes for each particular component. In 15 that way each displayed configuration is consistent and valid as to its attributes.

In order for the user to resize or reshape components, as shown in FIGURE 9, the user selects the component 182 to be changed using the pointing device 20 104. When this is done, the selected component becomes highlighted on the screen and arrows (184-192) are shown to depict the various directions in which the part can be resized. The selected part 182 can also be repositioned at another location.

25 The order generation system 114 will only allow components to be resized or reshaped to valid shapes.

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To ensure this requirement, the user interface 118 checks each resize and reshape operation, while it is ongoing, using the product attribute database 120. However, components can be moved to temporarily invalid locations. As described below, if a component is moved, the configuration will have to be checked and may have to be changed.

In the example shown in FIGURE 9, after the user has resized the component, the support 189 is too long. When the user selects the configuration option 150, the graphical user interface 118 invokes the modelling tool 116 which will replace the support 189 with one of the correct length.

The user can apply fabric and finishes to a typical product by selecting the select material icon 146 with the pointer 104. This enables the user to change all fabric and finish options on each individual component or on all components. When the user selects the select material icon 146, order generation system 114 presents the user with fabric color and finish options on the screen as shown in FIGURE 10. The order generation system 114 will only allow the user to change fabric or finish to valid (manufacturable components in the product line) options for the current components. In this way, the configuration depicted on the screen is always valid with respect to its fabric

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and finish. In order for the user to change a fabric or color, the user selects the appropriate option from those shown on the screen. The fabrics/colors are presented in families (three families in the example in FIGURE 10), so that selecting one color for a particular component will change the other parts of that component to the appropriate color from the family.

If, at any time, the user wants to capture an image of the configuration depicted on the screen, the user can select the snapshot icon 152 which causes the rendered image to be enhanced by sharpening and adding depth. These images can then be printed or cut and pasted into other applications.

The user can add components to the depicted typical by selecting the component icon 140 with the pointer device. This causes the order generation system 114 to present the user with a selection of components which can be added to the configuration (FIGURE 10). The selection includes shelves, panels, storage areas and the like. Generally any component from the product line can be added to a configuration.

Once a particular component is selected, the user positions that component on the typical configuration. The order generation system 114 will allow the user to position the component at an invalid location, since it is assumed that the entire configuration will be

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checked, and possibly adjusted, later. Thus, for example, the user is able to put a shelf on a panel that cannot support the shelf. This is acceptable since later the system will be reconfigured to replace the panel with one which can support the shelf.

5 Alternatively, if no supporting panel is available in the product line, the shelf will not be added.

In order to check the validity (that is, if it can be manufactured from the specified product line and is otherwise a valid configuration) of a modified workstation, the user selects the configuration check icon 150 from the screen 126. This causes the order generation system 114 to invoke the checker module which ensures validity of the depicted configuration.

10 Generally, the modelling tool 116 may indicate that the configuration is not feasible, feasible or it may provide various modifications. For example, it may recognize that one component may be split into two or vice versa. It will insert the appropriate support structure to ensure that the configuration can be built.

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Once the modelling tool 116 is done with its processing, it returns control to the user.

Once the user is satisfied with a particular typical configuration for a workspace, the user can generate a cluster of those typicals. In order to do

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this the user selects the "cluster" icon 144 from the screen 126. This causes the order generation system 114 to present the user with various clustering options (FIGURE 12). The user can then select one of the displayed clustering options and the order generation system 114 generates the appropriate cluster of the current typical.

In generating a cluster of typicals, the order generation system 114 invokes the modelling tool 116 to ensure that the cluster is feasible. The modelling tool 116 removes redundant structures such as common walls and replaces multiple parts with individual parts if possible. If necessary the modelling tool 116 also checks the typical to ensure that it is a valid configuration.

When done, the modelling tool 116 presents the user with a display of the selected cluster of typicals as shown in FIGURE 13.

The user can add other detached items such as chairs to a configuration. To do this, the user selects the seating selection icon 138 from the screen 126. When this is done the order generation system 114 presents the user with a display of chairs such as shown in FIGURE 14. The user can select one of the depicted chairs and that chair will be placed (freestanding) in the current cluster or typical.

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Once the current typical and/or cluster configuration is acceptable to the user, its price can be determined using the price icon 156. Selecting the price icon 156 causes the order generation system 114 to determine the price of the entire configuration and to present it to the user as shown in FIGURE 15. As can be seen from the quote depicted in FIGURE 15, at this time each component item in the configuration is listed and details about that item are given. This quote is for a valid configuration and can be sent directly to the ordering department.

Alternatively, in some embodiments, when a finalized configuration is determined, the quote may be an estimate requiring checking.

As noted above, the modelling system 116 bases its determinations on the input user requirements and on information in the product attribute database. It also uses a model of the inter-relationships between the various components. An example of such a model is shown in the following tables.

In the relationship maps below, the properties are coded as follows: "L" = load bearing, "N" = Non-load bearing, "A" = Provides Aft Support, and "G" = Supplies Ground (Floor) Support.

Environments							9000
	Service Parts						9000
		Interdependant Systems					9000
		Casewood Systems					9000
		Hanging Units					3000
		Hanging Shelves					3000
			premise_shelf	PRM	3000		
			places_display_shelf	PLC	3000		
			places_media_shelf	PLC	3000		
			places_mini_corner_shelf	PLC	3000		
			places_mini_end_of_run_shelf	PLC	3000		
			places_mini_straight_shelf	PLC	3000		
			places_monitor_shelf	PLC	3000		
			places_pass_through_shelf	PLC	3000		
			places_shelf	PLC	3000		
			places_shelf_with_coat_rod	PLC	3000		
							3000
							3000
							3000
		Hanging Lateral Files					3000
			places_hanging_lateral_file	PLC	3000		
			places_hanging_lateral_file	PLC	3000		
		Hanging Storage Units					3000
			premise_overhead_unit	PRM	3000		
			places_overhead_unit	PLC	3000		
			places_shelf_with_flipper_door	PLC	3000		
		Attached Units					4000
		Attached Peds					4000
			premise_attached_pedestal	PRM	4000		
			places_attached_fundamental_ped	PLC	4000		
			places_attached_pedestal	PLC	4000		
			places_attached_fundamental_ped	PLC	4000		
			places_attached_pedestal	PLC	4000		
		Attached Lateral Files					4000
			premise_attached_lateral_file	PRM	4000		
			places_attached_lateral_file	PLC	4000		
		Attached Bridges					4000
			premise_bridge	PRM	4000		
			places_bridge	PLC	4000		
			places_transition_bridge	PLC	4000		
		Attached Cabinets					4000
		Upper Attached Cabinets					4000
			new_views_upper_unit	PLC	4000		
			series_950_overfile	PLC	4000		
		Lower Attached Cabinets					4000
			premise_attached_storage_unit	PRM	4000		
			new_views_lower_unit	PLC	4000		
			places_credenza_door_unit	PLC	4000		
		Attached Corner Units					4000
			premise_corner_unit	PRM	4000		
			premise_wrap_around_unit	PRM	4000		
			places_corner_unit	PLC	4000		
		Attached Convergent Units					4000
			premise_convergent_unit	PRM	4000		
			premise_convergent_wrap_around	PRM	4000		
			places_convergent_unit	PLC	4000		

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		Attached Conference End Units		4000
		premise_conference_end_unit	PRM	4000
	Attached Returns			4000
		premise_return	PRM	4000
		places_return	PLC	4000
		places_transition_return	PLC	4000
	Attached Vertical Storage Units			4000
		premise_vertical_storage_unit	PRM	4000
		places_vertical_storage_unit	PLC	4000
	Attached Casegoods Shelves			4000
		premise_bookcase_shelf	PRM	4000
		premise_storage_unit_shelf	PRM	4000
		places_bookcase_shelf	PLC	4000
		places_storage_unit_shelf	PLC	4000
		places_wardrobe_shelf	PLC	4000
		series_950_bookcase_shelf	PLC	4000
		series_950_cabinet_shelf	PLC	4000
		series_950_overfile_shelf	PLC	4000

	Attached Credenzas			4000
		places_attached_credenza	PLC	4000
		series_950_credenza_file	PLC	4000
				8000
	Mobile Units			8000
	Mobile Peds			8000
		premise_mobile_pedestal	PRM	8000
		places_mobile_pedestal	PLC	8000
		trimes/mobile/pedestal	UNI	8000
	Mobile Tables			8000
		premise_mobile_conference_end	PRM	8000
		premise_mobile_teardrop_table	PRM	8000
		places_mobile_conference_end_ta	PLC	8000
		places_mobile_keyboard_table	PLC	8000
		places_mobile_machine_table	PLC	8000
		places_mobile_round_table	PLC	8000
		places_mobile_teardrop_table	PLC	8000
		trimes/mobile/keyboard/table	UNI	8000
		trimes/mobile/machine/table	UNI	8000
	Mobile Storage Units			8000
		new_views_mobile_cabinet	PLC	8000
	Stationary Units			9000
	Stationary Peds			9000
		places_stationary_fundamental_pe	PLC	9000
		places_stationary_pedestal	PLC	9000
		trimes/stationary/fundamental/ped	UNI	9000
		trimes/stationary/pedestal	UNI	9000
	Stationary Tables			9000
		premise_rectangular_table	PRM	9000
		premise_round_table	PRM	9000
		premise_stationary_conference_en	PRM	9000
		premise_stationary_teardrop_table	PRM	9000
		places_c_leg_table	PLC	9000
		places_oval_table	PLC	9000
		places_racetrack_table	PLC	9000
		places_rectangular_table	PLC	9000
		places_square_table	PLC	9000
		places_stationary_conference_end	PLC	9000
		places_stationary_machine_table	PLC	9000
		places_stationary_round_table	PLC	9000
		places_stationary_teardrop_table	PLC	9000
		places_table_desk	PLC	9000
		trimes/stationary/round	UNI	9000
		trimes/stationary/teardrop	UNI	9000
		trimes/stationary/rectangle	UNI	9000
		trimes/stationary/square	UNI	9000
	Stationary Vertical Files			9000
	Stationary Lateral Files			9000
		premise_stationary_lateral_file	PRM	9000
		places_stationary_lateral_file	PLC	9000
		series_950_combination_lateral_fil	PLC	9000
		series_950_lateral_file	PLC	9000
	Stationary Bookcases			9000
		premise_bookcase	PRM	9000
		places_bookcase	PLC	9000
		series_950_bookcase	PLC	9000
	Stationary Desks			9000

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					premise_desk	PRM	9000
					places_desk	PLC	9000
		Stationary Credenzas					9000
					premise_credenza	PRM	9000
					places_stationary_credenza	PLC	9000
		Stationary Wardrobes					9000
					places_wardrobe	PLC	9000
					series_950_wardrobe	PLC	9000
		Stationary Cabinets					9000
					premise_stationary_storage_unit	PRM	9000
					new_views_stationary_cabinet	PLC	9000
					new_views_storage_cabinet	PLC	9000
					places_stationary_storage_unit	PLC	9000
					series_950_storage_cabinet	PLC	9000
	Suspended Units						3000
		Suspended Peds					3000
					places_suspended_fundamental_p	PLC	3000
					places_suspended_pedestal	PLC	3000

Suspended Drawers					3000
	premise_pencil_drawer	PRM	3000		
	places_pencil_drawer	PLC	3000		
	places_steel_pencil_drawer	PLC	3000		
	places_wood_pencil_drawer	PLC	3000		
Casegood Accessories					9000
	premise_lateral_file_counterweight	PRM	9000		
	premise_vertical_storage_unit_temp	PRM	9000		
	places_flipper_door	PLC	9000		
	places_lateral_file_counterweight	PLC	9000		
	places_tug_a_ped	PLC	9000		
	places_vertical_storage_unit_retrof	PLC	9000		
	places_vertical_storage_unit_temp	PLC	9000		
	series_950_bookcase_top	PLC	9000		
	series_950_counterweight	PLC	9000		
	series_950_credenza_double_top	PLC	9000		
	series_950_credenza_single_top	PLC	9000		
	series_950_lock_bar	PLC	9000		
	series_950_storage_coat_rod	PLC	9000		
	series_950_storage_media_bar	PLC	9000		
	unigroup:all�32:do	PRM	9000		
Wall Systems					1000
Verticals					1000
Vertical Bases					1000
Mobile Bases					1000
Sliders					1000
Stationary Bases					1000
Beams					1000
Privacy Screens					1000
Scaffolds					1000
Panels					1000
Premise Panels					1000
Premise Doors					1000
premise_door	PRM	1000			
Premise Glazed Panels					1000
premise_glazed_panel	PRM	1000			
Premise Solid Panels					1000
premise_solid_panel	PRM	1000			
Places Panels					1000
Places Doors					1000
places_door	PLC	1000			
places_double_door	PLC	1000			
unigroup:do	PRM	1000			
Places Framed Panels					1000
places_open_panel	PLC	1000			
unigroup:open-pane	PRM	1000			
Places Glazed Panels					1000
Places Standard Glazed Panels					1000
places_glazed_panel	PLC	1000			
unigrou:glazed-panel	PRM	1000			
Places Gabled Glazed Panels					1000
places_glazed_gabled_panel	PLC	1000			
Places Oblique Glazed Panels					1000

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							places_glazed_oblique_panel	PLC	1000
							Places Solid Panels		1000
							Places Standard Solid Panels		1000
							places_solid_panel	PLC	1000
							places_gabled_panel	GIN	1000
							Places Gabled Solid Panels		1000
							places_gabled_panel	PLC	1000
							Places Oblique Solid Panels		1000
							places_oblique_panel	PLC	1000
							Places Beltline Solid Panels		1000
							places_beltline_panel	PLC	1000
							Places Ported Solid Panels		1000
							places_ported_panel	PLC	1000
							Stacked Verticals		2000
							Stack Kits		2000
							Pads		2000
							Extender Screens		2000
							Desking Screens		2000
							Fan Lights		6000

		places_fanlight	PLC	6000
				2000
	Modesty Panels	places_convergent_modesty_panel	PLC	2000
		places_corner_modesty_panel	PLC	2000
		places_straight_modesty_panel	PLC	2000
	Vertical Accessories			9000
		places_blind_kit	PLC	9000
		places_counter_top_end_cover	PLC	9000
		places_electronic_work_surface_e	PLC	9000
		places_muntin_kit	PLC	9000
		places_wainscot_kit	PLC	9000
		places_electronic_work_surface_e	PLC	9000
	Horizontals			3000
	Work Surfaces			3000
	Corner Work Surfaces			3000
	Height Adjustable Corner Work Surfaces			3000
		places_height_adjustable_corner_v	PLC	3000
		places_height_adjustable_split_c	PLC	3000
		places_height_adjustable_corn	PLC	3000
		places_height_adjustable_spli	PLC	3000
	Regular Corner Work Surfaces			3000
		premise_corner_work_surface	PRM	3000
		premise_wrap_around_work_surfa	PRM	3000
		places_corner_work_surface	PLC	3000
		places_wrap_around_work_surfac	PLC	3000
		places_wrap_around_work_surr	PLC	3000
		places_wrap_around_work_surr	PLC	3000
	Electronic Corner Work Surfaces			3000
		places_electronic_corner_work_su	PLC	3000
		places_electronic_corner_work_s	PLC	3000
	Transitional Corner Work Surfaces			3000
		premise_transitional_wrap_aro	PRM	3000
		places_transitional_corner_wor	PLC	3000
		places_transitional_wrap_aro	PLC	3000
		places_transitional_wrap_ar	PLC	3000
		places_transitional_wrap_ar	PLC	3000
	Rectangular Work Surfaces			3000
	Height Adjustable Rectangular Work Surfaces			3000
		places_height_adjustable_recta	PLC	3000
		places_height_adjustable_recta	PLC	3000
	Regular Rectangular Work Surfaces			3000
	Premise Regular Rectangular Work Surfaces			3000
		premise_radiused_rectangular_w	PRM	3000
		premise_rectangular_work_surfa	PRM	3000
		premise_split_rectangular_wor	PRM	3000
	Places Regular Rectangular Work Surfaces			3000
		places_monitor_work_surface	PLC	3000
		places_radiused_rectangular_wor	PLC	3000
		places_rectangular_work_surface	PLC	3000
		places_rectangular_work_surface	PLC	3000
		places_split_rectangular_work_s	PLC	3000
		places_group_rectangular_work_s	PLC	3000
		places_group_rectangular_work_s	PLC	3000
		places_group_rectangular_work_s	PLC	3000
		places_group_rectangular_work_s	PLC	3000

		Electronic Rectangular Work Surfaces		3000
		places_electronic_rectangular_wor	PLC	3000
		unplace_electronic_rectangular_wor	UN	3000
		Transitional Rectangular Work Surfaces		3000
		premise_transitional_rectangular_w	PRM	3000
		places_transitional_rectangular_w	PLC	3000
		unplace_transitional_rectangular_w	UN	3000
		Convergent Work Surfaces		3000
		Regeular Convergent Work Surfaces		3000
		premise_convergent_work_surface	PRM	3000
		places_convergent_work_surface	PLC	3000
		unplace_convergent_work_surface	UN	3000
		Shaped Convergent Work Surfaces		3000
		premise_shaped_wrap_around_wo	PRM	3000
		places_shaped_wrap_around_work	PLC	3000
		unplace_shaped_wrap_around_work	UN	3000
		Conference Ends		3000
		Regular Conference Ends		3000
		premise_conference_end_work_su	PRM	3000

		places_conference_end_work_surf	PLC	3000
		places_rectangular_end_work_surf	NIN	3000
	Single Run Conference Ends			3000
		premise_curved_work_surface	PRM	3000
		premise_teardrop_end_work_surf	PRMI	3000
		places_curved_work_surface	PLC	3000
		places_d_shaped_end_work_surf	PLC	3000
		places_teardrop_end_work_surf	PLCI	3000
		places_rectangular_end_work_surf	PRM	3000
		places_rectangular_end_work_surf	NIN	3000
	Countertops			3000
	Straight Countertops			3000
		premise_rectangular_counter_top	PRM	3000
		places_rectangular_counter_top	PLC	3000
		places_wheelchair_reception_coun	PLC	3000
		places_rectangular_counter_top	NIN	3000
	Corner Countertops			3000
		places_corner_counter_top	PLC	3000
		places_rectangular_counter_top	NIN	3000
	Horizontal Accessories			3000
		premise_keyboard_holders	PRM	3000
		premise_mouse_pad	PRM	3000
		premise_palm_rest	PRM	3000
		places_carousel	PLC	3000
		places_corner_canopy	PLC	3000
		places_electronic_transition_cover	PLC	3000
		places_keyboard_holders	PLC	3000
		places_make_a_corner	PLC	3000
		places_mouse_pad	PLC	3000
		places_palm_rest	PLC	3000
		places_rectangular_canopy	NIN	3000
		places_rectangular_transition_cove	NIN	3000
		places_rectangular_transition_cove	NIN	3000
		places_rectangular_transition_cove	NIN	3000
		places_rectangular_transition_cove	NIN	3000
	Table Tops			3000
	Vertical Supports			7000
	Covers			7000
	Finish Covers			7000
		premise_variable_height_cover	PRM	7000
		places_canopy_finish_post	PLC	7000
		places_electrical_end_cap	PLC	7000
		places_end_of_run_post	PLC	7000
		places_finish_post	PLC	7000
		places_variable_end_of_run_post	PLC	7000
		places_electrical_end_cap	NIN	7000
		places_end_of_run_post	NIN	7000
		places_finish_post	NIN	7000
		places_variable_end_of_run_post	NIN	7000
	Electrical Covers			7000
		new_views_base_cover_kit	PLC	7000
		places_180_connector_cover	PLC	7000

			places_90_connector_cover	PLC	7000
			places_90_connector_invert	PLC	7000
			places_90_connector_invert	PLC	7000
	Connectors				7000
	T-Mount Kit				7000
			new_views_t_mount_bracket	PLC	7000
	Standard Connectors				7000
			premise_connector	PRM	7000
			places_hinge	PLC	7000
			places_hinge	PLC	7000
	Modesty Panel Supports				7000
			places_modesty_to_cabinet_brack	PLC	7000
			places_modesty_to_panel_bracket	PLC	7000
	Posts				7000
	Upper Posts				7000
	Lower Posts				7000
	Architectural Connections				7000

	Horizontal Supports					7000
	Table Bases					7000
	Brackets					7000
	Panel Attached Brackets					7000
		premise_pedestal_to_panel_brack	PRM			7000
		premise_work_surface_cantilever	PRM			7000
		premise_work_surface_corner_bra	PRM			7000
		places_included_work_surface_car	PLC			7000
		places_work_surface_cantilever	PLC			7000
		places_work_surface_corner_brac	PLC			7000
		places_work_surface_panel_moun	PLC			7000
		places_work_surface_side_mount	PLC			7000
		places_work_surface_slope_moun	PLC			7000
		series_950_credenza_file_work_su	PLC			7000
		[REDACTED]	[REDACTED]			7000
		[REDACTED]	[REDACTED]			7000
		[REDACTED]	[REDACTED]			7000
		[REDACTED]	[REDACTED]			7000
	Non-Panel Attached Brackets					7000
		premise_work_surface_drop_moun	PRM			7000
		premise_work_surface_flush_moun	PRM			7000
		new_views_cabinet_to_work_surfa	PLC			7000
		places_work_surface_drop_mount	PLC			7000
		places_work_surface_flush_mount	PLC			7000
		[REDACTED]	[REDACTED]			7000
		[REDACTED]	[REDACTED]			7000
	Legs					7000
		premise_work_surface_support_le	PRM			7000
		places_work_surface_support_lég	PLC			7000
		[REDACTED]	[REDACTED]			7000
	Worksurface Support Panels					7000
		premise_work_surface_support_pa	PRM			7000
		places_conference_end_support	PLC			7000
		places_work_surface_end_full_sup	PLC			7000
		places_work_surface_end_half_su	PLC			7000
		places_work_surface_support_pan	PLC			7000
		[REDACTED]	[REDACTED]			7000
	Height Adjustment Kits					7000
		premise_lateral_file_height_adju	PRM			7000
		premise_pedestal_height_adjustme	PRM			7000
		premise_storage_unit_height_adju	PRM			7000
	Adjustable Supports					7000
		places_height_adjustable_corner_r	PLC			7000
		places_height_adjustable_rectang	PLC			7000
		places_height_adjustable_split_c	PLC			7000
		[REDACTED]	[REDACTED]			7000
		[REDACTED]	[REDACTED]			7000
		[REDACTED]	[REDACTED]			7000
	Seating					8000
	Auditorium Seating					8000
	Adjustable Seating					8000
		accolade_caster_base_chair	STG			8000
		accolade_caster_base_stool	STG			8000
		improv_caster_base_chair	STG			8000
		improv_he_caster_base_chair	STG			8000

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	Stackable Seating					8000
			improv_leg_base_stacking_chair	STG	8000	
	Non-Adjustable Seating					8000
			accolade_sled_base_chair	STG	8000	
			improv_leg_base_stool	STG	8000	
			improv_sled_base_chair	STG	8000	
	Lounge Seating					8000
	Benches					8000
	Single Lounge Seating					8000
	Multiple Lounge Seating					8000
	Power and Data					5000
	Power and Data Providers					5000
	In-Feeds					5000
			premise_base_feed_module	PRM	5000	
			premise_top_feed_module	PRM	5000	
			places_base_feed_module	PLC	5000	
			places_top_feed_module	PLC	5000	
			unigroup_base_feed_module	UNI	5000	

			UNITS
Out-Feeds	premise_base_outfeed_outlet	PRM	5000
	premise_base_igr_receptacle	PRM	5000
	premise_base_receptacle	PRM	5000
	premise_panel_communications_p	PRM	5000
	premise_panel_power_port_kit	PRM	5000
	places_base_igr_receptacle	PLC	5000
	places_base_igr_surge_protector	PLC	5000
	places_base_receptacle	PLC	5000
	places_smart_work_surface_power	PLC	5000
	places_switching_system_kit	PLC	5000
	places_switching_system_power_s	PLC	5000
	places_switching_system_receptac	PLC	5000
	places_switching_system_wall_swi	PLC	5000
	places_work_surface_duplex_rec	PLC	5000
	places_work_surface_power_modu	PLC	5000
	[REDACTED]	INT	5000
Power and Data Routers			5000
Power and Data Channels			5000
	premise_vertical_wire_manager	PRM	5000
	places_cable_management_post	PLC	5000
	places_horizontal_wire_manager_3	PLC	5000
	places_horizontal_wire_manager_4	PLC	5000
	places_variable_height_cable_ma	PLC	5000
	[REDACTED]	INT	5000
	[REDACTED]	INT	5000
	[REDACTED]	INT	5000
Power and Data Connectors			5000
	premise_extended_power_connect	PRM	5000
	premise_flexible_power_connector	PRM	5000
	premise_straight_span_power_co	PRM	5000
	places_base_to_beltline_power_co	PLC	5000
	places_beltline_to_beltline_power	PLC	5000
	places_extended_power_connecto	PLC	5000
	places_flexible_power_connector	PLC	5000
	places_straight_power_connector	PLC	5000
	[REDACTED]	INT	5000
	[REDACTED]	INT	5000
	[REDACTED]	INT	5000
Cable Management			5000
	premise_grommet	PRM	5000
	premise_wire_management_loop	PRM	5000
	places_cable_management_beltlin	PLC	5000
	places_cable_management_ported	PLC	5000
	places_cable_management_top_ca	PLC	5000
	places_grommet	PLC	5000
	places_wire_basket	PLC	5000
	places_wire_management_loop	PLC	5000
	places_wire_management_module	PLC	5000

				places_wire_manager	PLC	5000
				places_work_surface_power_modu	PLC	5000
				places_work_surface_power_modu	PLC	5000
				places_task_light	PLC	5000
				places_task_light	PLC	5000
				Lighting		6000
				Horizontally Mounted Lighting		6000
				premise_task_light	PRM	6000
				premise_vertical_storage_task_ligh	PRM	6000
				places_canopy_light	PLC	6000
				places_counter_top_task_light	PLC	6000
				places_freestanding_pivot_head_ta	PLC	6000
				places_task_light	PLC	6000
				places_computer_top_task_light	PLC	6000
				places_standing_studio_pivot	PLC	6000
				places_task_light	PLC	6000
				Vertically Mounted Lighting		6000
				places_grid_hung_pivot_head_task	PLC	6000

	places_panel_hung_fluorescent_lid	PLC	6000
	places_panel_hung_pivot_head_ta	PLC	6000
	places_panel_mounted_fluorescen	PLC	6000
	places_post_mount_street_light	PLC	6000
	places_street_light	PLC	6000
	[REDACTED]		6000
Floor Mounted Lighting			6000
Lighting Accessories			6000
	places_fluorescent_light_saddle_m	PLC	6000
	places_painted_shelf_task_light_b	PLC	6000
	places_vertical_storage_task_light	PLC	6000
	places_wood_shelf_task_light_bra	PLC	6000
	[REDACTED] places_fluorescent_light_saddle_m		6000
	[REDACTED] places_painted_shelf_task_light_b		6000
Organization			9000
Tackable Surfaces			9000
	premise_tackboard	PRM	9000
	places_grid_tackstrip	PLC	9000
	places_tackboard	PLC	9000
	[REDACTED] premise_tackboard		9000
Markable Surfaces			9000
	premise_markerboard	PRM	9000
	places_markerboard	PLC	9000
	[REDACTED] premise_markerboard		9000
Workflow Devices			9000
Vertical Workflows			9000
	premise_all_purpose_hook	PRM	9000
	premise_lateral_file_drawer_compr	PRM	9000
	premise_lateral_file_drawer_divide	PRM	9000
	premise_lateral_file_front_to_back	PRM	9000
	premise_lateral_file_side_to_side	PRM	9000
	premise_pedestal_drawer_divider	PRM	9000
	premise_shelf_divider	PRM	9000
	paper_management_bar	PRM	9000
	paper_management_freestanding	PLC	9000
	paper_management_suspended_v	PLC	9000
	new_views_shelf_divider	PLC	9000
	places_all_purpose_hook	PLC	9000
	places_fundamental_pedestal han	PLC	9000
	places_fundamental_pedestal_si	PLC	9000
	places_lateral_file_front_to_bac	PLC	9000
	places_organization_grid	PLC	9000
	places_shelf_divider	PLC	9000
	places_vertical_storage_unit_gr	PLC	9000
	tri_mode_paper_management_bar	PLC	9000
	tri_mode_vertical_unit	PLC	9000
	series_950_drawer_compressor	PLC	9000
	series_950_drawer_divider	PLC	9000
	series_950_front_to_back_hangin	PLC	9000
	series_950_side_to_side_hanging	PLC	9000

		Horizontal Workflows	UNI	9000
		premise_pedestal_pencil_tray	PRM	9000
		paper_management_freestanding	PLC	9000
		paper_management_suspended_h	PLC	9000
		paper_management_trays	PLC	9000
		paper_management_under_shelf_t	PLC	9000
		places_freestanding_grid_mailbox	PLC	9000
		places_fundamental_pedestal_tray	PLC	9000
		places_grid_mailbox	PLC	9000
		places_grid_reference_tray	PLC	9000
		tri_mode_divider		9000
		tri_mode_hanger_clip		9000
		tri_mode_horizontal_shelves		9000
		tri_mode_horizontal_unit		9000
		Diagonal Workflows		9000
		paper_management_freestanding	PLC	9000
		paper_management_suspended_d	PLC	9000

							tri_mode_diagonal_unit	PLC	9000
									9000
							places_grid_diskette_bin	PLC	9000
							places_grid_storage_bin	PLC	9000
									9000
Services									

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## Relationship Maps (part 1 of 34)

Class Structure	Component Name	Prod Line	Proper ties	Inher- its	From	C#	Relationships	Constraint		Light Weight	Relationships
<u>Environments</u>					N/A				"LWC: Environments"		
<u>Service Parts</u>					\$A\$3				1 (Overridden at lower class levels)		
<u>Interdependant Systems</u>					N/A				???		
<u>Casegood Systems</u>					\$B\$5				???		
<u>Hanging Units</u>					\$C\$6	1	"Hang Stuff" AND "HU"		1	"LW Hang Stuff"	
<u>Hanging Shelves</u>					\$D\$7	Inh				Inh	
	premise_shelf	PRM				Inh				Inh	
	places_display_shelf	PLC				Inh				Inh	
	places_media_shelf	PLC				Inh				Inh	
	places_mini_corner_shelf	PLC				Inh				Inh	
	places_mini_end_of_run_shelf	PLC				Inh				Inh	
	places_mini_straight_shelf	PLC				Inh				Inh	
	places_monitor_shelf	PLC				Inh				Inh	
	places_pass_through_shelf	PLC					1	Requires an open panel	1	Override x/z_pos such that panel bisects shelf	
	places_shelf	PLC				Inh				Inh	
	places_shelf_with_coat_rod	PLC				Inh				Inh	
<u>Hanging Lateral Files</u>					\$D\$7	Inh				Inh	
	places_hanging_lateral_file	PLC				Inh				Inh	
<u>Hanging Storage Units</u>					\$D\$7	Inh				Inh	
	premise_overhead_unit	PRM				Inh				Inh	
	places_overhead_unit	PLC				Inh				Inh	
	places_shelf_with_flipper_door	PLC				Inh				Inh	
<u>Attached Units</u>					\$C\$6	1				If attaching to a member of X_Credenzas or X_Desks, must attach to the "open" front	

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## Relationship Maps (part 2 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From	C#	Relationships	Constraint	Inher- its	Light Weight
<b>Attached Peds</b>	premise_attached_pedestal	PRM	AFG #REF!	AFG \$D\$25	1 "AP"			L# 1	"Set AP Depth" and "Place Storage"
	places_attached_fundamental_pedestal	PLC				Inh			
	places_attached_pedestal	PLC				Inh			
<b>Attached Lateral Files</b>	premise_attached_lateral_file	PRM		AFG \$D\$25	1 "ALF"			L# 1	"Place Storage"
	places_attached_lateral_file	PLC				Inh			
<b>Attached Bridges</b>	premise_bridge	PRM		\$D\$25	1 "AB"			L# 1	"Center on Floor" AND "Attach Bridge/Return"
	places_bridge	PLC				Inh			
	places_transition_bridge	PLC				Inh			
<b>Attached Cabinets</b>				\$D\$25					
<b>Upper Attached Cabinets</b>				\$E\$37					
	new_views_upper_unit	PLC				1 "UAC nv-uu"		???	
	series_950_overfile	PLC				??? Must sit on top of ???		???	

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Relationship Maps (part 3 of 34)

Class Structure	Proper ties	Inher- its	Constraint	Light Weight
	Component Name	C#	Relationships	Relationships
: Lower Attached Cabinets				
premise_attached_storage_unit	PRM	\$E\$37	1 "LAC"	???
new_views_lower_unit	PLC		1 "LAC prm-asu"	"Center on Floor" and "Set LWC Position Attached Lateral File And Storage Unit"
places_credenza_door_unit	PLC		1 "LAC nv-lu"	1
???				???
Attached Corner Units				
premise_corner_unit	PRM	\$D\$25	1 Both sides must attach to a member of Attached_Returns/ Bridges/ Credenzas/ Desks	"Center on Floor"
premise_wrap_around_unit	PRM		Inh	Inh
places_corner_unit	PLC		Inh	Inh
Inh			Inh	Inh
Attached Convergent Units				
premise_convergent_unit	PRM	\$D\$25	1 "AConvU"	1 "Center on Floor"
premise_convergent_wrap_around_d_unit	PRM	49	Inh	Inh
places_convergent_unit	PLC		Inh	Inh
Inh			Inh	Inh
Attached Conference End Units				
premise_conference_end_unit	PRM	\$D\$25	Inh	Inh
Attached Returns				
premise_return	PRM	\$D\$25	1 "ARet"	1 "Center on Floor"
places_return	PLC		Inh	Inh
If 30" panel used as return, WS must use brackets, not cantilevers			1	1
places_transition_return	PLC		If 30" panel used as return, WS must use brackets, not cantilevers	Inh

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## Relationship Maps (part 4 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From	Inher- its	C#	Relationships	Constraint	Light Weight	
									L#	Relationships
<b>Attached Vertical Storage Units</b>										
	premise_vertical_storage_unit	PRM			\$D\$25	1	"AVSU"		1	"Center on Floor"
	places_vertical_storage_unit	PLC				Inh			Inh	
						Inh			Inh	
<b>Attached Casegoods Shelves</b>										
	premise_bookcase_shelf	PRM			\$D\$25	n/a	ACCESSORY		n/a	ACCESSORY
	premise_storage_unit_shelf	PRM				n/a	ACCESSORY		n/a	ACCESSORY
	places_bookcase_shelf	PLC				n/a	ACCESSORY		n/a	ACCESSORY
	places_storage_unit_shelf	PLC				n/a	ACCESSORY		n/a	ACCESSORY
	places_wardrobe_shelf	PLC				n/a	ACCESSORY		n/a	ACCESSORY
	series_950_bookcase_shelf	PTC				n/a	ACCESSORY		n/a	ACCESSORY
	series_950_cabinet_shelf	PLC				n/a	ACCESSORY		n/a	ACCESSORY
	series_950_overfile_shelf	PLC				n/a	ACCESSORY		n/a	ACCESSORY
						\$D\$25	Must attach to a member of X_Corners or X_Desks	1	"Center on Floor"	
<b>Attached Credenzas</b>										
	places_attached_credenza	PLC				Inh			Inh	
							must sit under worksurface, flush to front - exactly the same as Attached Drawer Pedestal (has no top)			
	series_950_credenza_file	PLC						Inh		

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## Relationship Maps (part 5 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From C#	Inher- its	Constraint	Light Weight	
							L#	Relationships
Mobile Units				\$C\$6	1	Must sit on floor	1	"Center on Floor"
Mobile Peds				\$D\$74			Inh	
	premise_mobile_pedestal	PRM					Inh	
	places_mobile_pedestal	PLC					Inh	
Mobile Tables				\$D\$74				
	premise_mobile_conference_end_table	PRM					Inh	
	premise_mobile_teardrop_table	PRM					Inh	
	places_mobile_conference_end_table	PLC					Inh	
	places_mobile_keyboard_table	PLC					Inh	
	places_mobile_machine_table	PLC					Inh	
	places_mobile_round_table	PLC					Inh	
	places_mobile_teardrop_table	PLC					Inh	
Mobile Storage Units				\$D\$74				
	new_views_mobile_cabinet	PLC					Inh	

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Relationship Maps (part 6 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From	C#	Relationships	L#	Inher- its		Constraint		Light Weight		Relationships
Stationary Units								\$C\$6	1	Must sit on floor		1	"Center on Floor"	
Stationary Peds								\$D\$88						Inh
places_stationary_pedestal	fundamental_pedestal	PLC						???						Inh
places_stationary_pedestal	stationary_pedestal	PLC						???						Inh
Stationary Tables								\$D\$88						Inh
premise_rectangular_table	PRM							???						Inh
premise_roun_d_table	PRM							???						Inh
premise_stationary_end_table	PRM							???						Inh
premise_stationary_teardrop_table	PRM							???						Inh

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## Relationship Maps (part 7 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From	C#	Relationships	Constraint		Light Weight	Relationships	L#
							Inher- its				
	places_c_leg_table	PLC			???					Inh	
	places_oval_table	PLC			???					Inh	
	places_racetrack_table	PLC			???					Inh	
	places_rectangular_table	PLC			???					Inh	
	places_square_table	PLC			???					Inh	
	places_stationary_conference_end_table	PLC			???					Inh	
	places_stationary_machine_table	PLC			???					Inh	
	places_stationary_round_table	PLC			???					Inh	

Relationship Maps (part 8 of 34)

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				Inher- its	Constraint		Light Weight	
		Prod Line	Proper- ties	From	C#	Relationships	L#	Relationships
Component Name								
places_stationary_teardown_table	PLC			???			Inh	
places_table_desk	PLC			???			Inh	
<b>Stationary Vertical Files</b>				\$D\$88				
<b>Stationary Lateral Files</b>				\$D\$88				
premise_stationary_lateral_file	PRM			???			Inh	
places_stationary_lateral_file	PLC			???			Inh	
<b>series_950_combination_lateral_file</b>		PLC						
<b>series_950_lateral_file</b>		PLC						
<b>Stationary Bookcases</b>				\$D\$88				
premise_bookcase	PRM				Inh		Inh	
places_bookcase	PLC				Inh		Inh	
<b>series_950_bookcase</b>		PLC				2/3/4/5 high - settable via properties		
<b>Stationary Desks</b>				\$D\$88				
premise_desk	PRM				???		Inh	
places_desk	PLC				???		Inh	
<b>Stationary Credenzas</b>				\$D\$88				
premise_credenza	PRM				???		Inh	
places_stationary_credenza	PLC				???		Inh	
<b>Stationary Wardrobes</b>		places_wardrobe	PLC	\$D\$88				Inh

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Relationship Maps (part 9 of 34)

Class Structure		Component Name	Inher-its	Constraint		Light Weight	
Prod Line	Proper ties	From	C#	Relationships	L#	Relationships	
				Stands there, only 1 size (uses series_950_storage_cabinet mettale)			
series_950_wardrobe	PLC				Inh		
<b>Stationary Cabinets</b>			\$D\$88				
premise_stationary_storage_unit	PHM		???		Inh		
new_views_stationary_cabinet	PLC			Inh	Inh		
new_views_storage_cabinet	PLC			Inh	Inh		
places_stationary_storage_unit	PLC			Inh	Inh		
series_950_storage_cabinet	PLC		\$C\$6	Stands there - 4 or 5 high - no shelves or 3 shelves			
<b>Suspended Units</b>							
places_suspended_fundamental_pedestal	PLC		\$D\$132	Mounts under WS, Return, Desk, 1 or Credenza - but not a Bridge	1	"Place Storage" AND "LWC: Set SP Depth/Pos"	
places_suspended_pedestal	PLC			Inh	Inh		
<b>Suspended Drawers</b>						Must Mount to Front Edge of Worksurface	
premise_pencil_drawer	PRM		\$D\$132	1	Inh		
places_pencil_drawer	PLC				Inh		
places_steel_pencil_drawer	PLC				Inh		
places_wood_pencil_drawer	PLC				Inh		

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## Relationship Maps (part 10 of 34)

		Inher- its	Constraint		Light Weight Relationships	
Class Structure	Component Name	Proper- ties	From	C#	Relationships	L#
Casegood Accessories		\$C\$6			ACCESSORY (Note: 1 included n/a with 2-highs)	
	premise_lateral_file_couterweight	PRM			Dep ACCESSORY	
	premise_vertical_storage_unit_template	PRM			Dep ACCESSORY	
	places_flipper_door	PLC		???	???	
	places_lateral_file_couterweight	PRM			Dep ACCESSORY	
	places_tug_a_ped	PLC			Dep ACCESSORY	
	places_vertical_storage_unit_retrofit_kit	PLC			n/a ACCESSORY	
	places_vertical_storage_unit_template	PLC			n/a ACCESSORY	
	series_950_bookcase_top	PLC			Must be the same size as target bookcase	
	series_950_countertop	PLC			n/a ACCESSORY	
	series_950_couterweight	PLC			n/a ACCESSORY	
	series_950_credenza_double_top	PLC			contiguous top for 2 bins of same height and width	
	series_950_credenza_single_top	PLC			used when a CF is in the open	
	series_950_lock_bar	PLC			n/a ACCESSORY	
	series_950_storage_coat_rod	PLC			n/a ACCESSORY	
	series_950_storage_media_bar	PLC			n/a ACCESSORY	
Wall Systems					\$B\$5	
Verticals					\$C\$156	
Vertical Bases					\$D\$157	
Mobile Bases					\$E\$158	
Sliders					\$F\$159	
Stationary Bases					\$G\$158	

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Relationship Maps (part 11 of 34)

Class Structure		Component Name		Inher-its	Constraint		Light Weight	
		Line	Proper-ties	From	C#	Relationships	L#	Relationships
Beams				\$F\$161				
Privacy Screens				\$F\$161				
Scaffolds				\$F\$161				
Panels				\$F\$161	1	Panels Require Support (Physics Constraint)	1	"LWC: Panels"
Premise Panels				\$G\$165	1	"PRM Panels"		
Premise Doors				\$H\$166	1	'PRM Doors'		
Premise Glazed Panels				\$H\$166		Inh		
Premise Solid Panels				\$H\$166		Inh		
Places Panels				\$G\$165	1	"PLC Panels"		
Places Doors				\$H\$173	1			Door-Swing must match the direction of the return panel and the hinged side of the door should be towards the supporting panels
places door	PLC							Must have a return panel >=24" deep that's <=24" unloaded standard panel away from hinge

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Relationship Maps (part 12 of 34)

Class Structure		Inher- its		Constraint		Light Weight Relationships	
Prod Line	Component Name	Prop- erties From	C#	Relationships	L#		
	places_double_door	PLC		Must have a return panel at each hinge - i.e. 0" away	Inh		
<b>Places Framed Panels</b>				Framed Panels Have Restrictions (Physics Constraint)	Inh		
	places_open_panel	PLC			Inh		
<b>Glazed Panels</b>							
				\$H\$173			
<b>Standard Glazed Panels</b>					Inh		
	places_glazed_panel	PLC					
				\$H\$179			
<b>Gabled Glazed Panels</b>					Inh		
	places_glazed_gabled_panel	PLC					
				\$H\$179			
<b>Oblique Glazed Panels</b>					Inh		
	places_glazed_oblique_panel	PLC					
				\$H\$179			
<b>Solid Panels</b>					Inh		
	places_solid_panel	PLC					
				\$H\$173			
<b>Standard Solid Panels</b>					Inh		
				\$H\$186			
<b>Gabled Solid Panels</b>					Inh		
	places_gabled_panel	PLC					
				\$H\$186			
<b>Oblique Solid Panels</b>					Inh		
	places_oblique_panel	PLC					
				\$H\$186			
<b>Bellline Solid Panels</b>					Inh		

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## Relationship Maps (part 13 of 34)

Class Structure	Component Name	Prod Line	Proper-ties	From	C#	Relationships	L#	Inher-its		Constraint		Light Weight	
								Inh	Inh	Inh	Inh	Inh	Inh
Ported Solid Panels	places_belline_panel	PLC			\$1\$186								
Stacked Verticals	places_ported_panel	PLC			\$D\$157								
Stack Kits					\$E\$197								
Pads					\$E\$197								
Extender Screens					\$E\$197								
Desking Screens					\$E\$197								
Fan Lights	places_fanlight	PLC			\$E\$197	1 "FL"							
Modesty Panels					\$D\$157								
	places_convergent_modesty_panel	PLC			n/a	NOT IN PHASE I							
	places_corner_modesty_panel	PLC			n/a	NOT IN PHASE I							
	places_straight_modesty_panel	PLC			n/a	NOT IN PHASE I							

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Relationship Maps (part 14 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From	C#	Relationships	L#	Inher- its		Constraint		Light Weight		Relationships
Vertical Accessories	places_blind	Kit	PLC			\$D\$157								
	places_counter_top_end_cover		PLC											
	places_electronic_work_surface_end_cover		PLC											

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## Relationship Maps (part 15 of 34)

Class Structure	Component Name	Prod Line	Proper ties	Inher- its	Constraint	Light Weight
			C#	Relationships	L#	Relationships
	places_muntin_kit	PLC		Must attach to Places 1 Glazed Panels, matching its size		
	places_wainscot_kit	PLC		Must attach to Places 1 Glazed Panels, matching its size		
Horizontals				\$C\$156		
Work Surfaces		L	\$D\$214	1 "Hang Stuff" AND "Work Surfaces"	1 "Hang Stuff"	
Corner Work Surfaces			\$E\$215	1 Require "3-corner" support		
Height Adjustable Corner Work Surfaces			\$F\$216			
places_height_adjustable_corner_work_surface	PLC					
places_height_adjustable_split_corner_work_surface	PLC					
Regular Corner Work Surfaces			\$F\$216			
places_premise_corner_work_surface	PRM			1 "RCornWS prm-cws"		
places_premise_wrap_around_work_surface	PRM			1 "RCornWS prm-waws"		
places_places_corner_work_surface	PLC					
places_places_wrap_around_work_surface	PLC					
Electronic Corner Work Surfaces						
places_electronic_corner_work_surface	PLC		\$F\$216	1	If 2 adjacent electronic WS are separated by 2" gap (i.e. they span a 3-way junction) they need 1 places_electronic_work_surface_transtion_cover between them	

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## Relationship Maps (part 16 of 34)

Class Structure	Component Name	Prod Line	Proper ties	Inher- its	Constraint	Light Weight	
						L#	Relationships
Transitional Corner Work Surfaces				\$F\$216			
premise_transitional_wrap_around_work_surface	PRM				1 "TCWS prm-twaws"		
places_transitional_corner_work_surface	PLC						
places_transitional_wrap_around_work_surface	PLC						
Rectangular Work Surfaces							
Height Adjustable Rectangular Work Surfaces				\$E\$215			
places_height_adjustable_rectangular_work_surface	PLC						
Regular Rectangular Work Surfaces				\$F\$231			
Premise_Regular_Rectangular_Work_Surfaces					1 "RegRectWS"		
premise_radiused_rectangular_work_surface	PRM					Premise Work Surfaces must have	
premise_rectangular_work_surface	PRM					floor support every 5'	
premise_split_rectangular_work_surface	PRM					\$G\$234	1 "PRRWs prm-rws"
premise_split_rectangular_work_surface	PRM						1 "PRRWs prm-rws"
premise_split_rectangular_work_surface	PRM						1 "PRRWs prm-srws"

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Relationship Maps (part 17 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From C#	Relationships	Constraint		Light Weight	Relationships
						Inher- its			
<i>Places_Regular_Rectangular_Work_Surfaces</i>									
	places_monitor_work_surface	PLC		\$G\$234					
	places_radiused_rectangular_work_surface	PLC							
	places_rectangular_work_surface	PLC							
	places_rectangular_work_surface_top	PLC							
	places_split_rectangular_work_surface	PLC							

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Relationship Maps (part 18 of 34)

Class Structure		Relationships		Constraint		Light Weight Relationships	
Prod Line	Proper ties	From	C#		L#		
<b>Electronic Rectangular Work Surfaces</b>				If 2 adjacent electronic WS are separated by 2" gap (i.e. they span a 3-way junction) they need 1 places_electronic_work_surface_ltr transition_cover between them			
places_electronic_rectangular_work_surface	PLC		\$F\$231	1			
<b>Transitional Rectangular Work Surfaces</b>							
premise_transitional_rectangular_work_surface	PRM		\$F\$231				
places_transitional_rectangular_work_surface	PLC						
<b>Convergent Work Surfaces</b>							
<b>Regular Convergent Work Surfaces</b>							
premise_convergent_work_surface	PRM		\$F\$250				
places_convergent_work_surface	PLC						
<b>Shaped Convergent Work Surfaces</b>							
premise_shaped_wrap_around_work_surface	PRM		\$F\$250				
places_shaped_wrap_around_work_surface	PLC						
<b>Conference Ends</b>							
premise_conference_end_work_surface	PRM		\$F\$257				
<b>Regular Conference Ends</b>							
premise_conference_end_work_surface	PRM						

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## Relationship Maps (part 19 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From	C#	Relationships	Constraint		Light Weight Relationships	
							Inher- its		L#	
<b>Single Run Conference Ends</b>										
places_conference_end_work_surface	PRM	PLC	\$F\$257							
premise_curved_work_surface	PRM						1 "SRCE prm-ows"			
premise_teardrop_end_work_surface	PRM						1 "SRCE prm-tews"			
places_curved_work_surface	PLC									
places_d_shaped_end_work_surface	PLC									
places_teardrop_end_work_surface	PLC									
<b>Countertops</b>										
			\$D\$214							
<b>Straight Countertops</b>										
premise_rectangular_counter_top	PRM	PLC	\$E\$267				Mounts on top of in-line panel run of uniform (<=53") height longer than the width of the counter top			
places_rectangular_counter_top	PLC									
places_wheelchair_reception_counter_top	PLC						Must be installed over two solid panels: 1) 48" counter over two 24" wide panels, 2) 60" counter over two 36" wide panels			
							1			

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Relationship Maps (part 20 of 34)

Class Structure	Component Name	Prod Line	Proper ties	Inher- its	Constraint	Light Weight	
						L#	Relationships
Corner Countertops	places_corner_counter_top	PLC		\$E\$267			
					1 "CC plc-cct"		
Horizontal Accessories	premise_keyboard_holders	PRM		\$D\$214			
	premise_mouse_pad	PRM					

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Relationship Maps (part 21 of 34)

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## Relationship Maps (part 22 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From	Inher- its	Constraint	Light Weight	
							L#	Relationships
	new_views_base_cover_kit	PLC					???	
	places_180_connector_cover	PLC						
	places_90_connector_cover	PLC						
Connectors				\$D\$286	1	Must sit on floor		
T-Mount Kit				\$E\$299	1	Cannot position the T-mount within .82" from end of panel		
	new_views_t_mount_bracket	PLC			inh		???	
Standard Connectors				\$E\$299				
	premise_connector	PRM			1	Must be as tall as the tallest panel being joined		
	places_hinge	PLC						
Modesty Panel Supports				\$D\$286				
	places_modesty_to_cabinetBracket	PLC						
	places_modesty_to_panelBracket	PLC				n/a NOT IN PHASE I		n/a NOT IN PHASE I

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## Relationship Maps (part 23 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From	Inher- its	Constraint	Light Weight	
							L#	Relationships
Posts				\$D\$286				
Upper Posts				\$E\$308				
Lower Posts				\$E\$308				
Architectural Connections				\$D\$286				
Horizontal Supports				\$C\$156				
Table Bases				\$D\$312	1	Must sit on floor		

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## Relationship Maps (part 24 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From	Inher- its	Constraint	Light Weight
				C#	Relationships	L#	Relationships
Brackets				\$D\$312			
	Panel Attached Brackets			\$E\$314			
				AF (when used in pairs)			
	premise_pedestal_to_panel_bracket	PRM			Unable to support 30" deep work surface with only cantilevers	n/a	
	premise_work_surface_cantilever	PRM	AF		The long side of the bracket must align to a Panel (i.e. bracket must "clip" to a panel)	n/a	
	premise_work_surface_corner_bracket	PRM	AF		1	n/a	
	places_included_work_surface_cantilever	PLC			n/a	n/a	
	places_work_surface_cantilever	PLC					
	places_work_surface_corner_bracket	PLC					
	places_work_surface_panel_mount	PLC					
	places_work_surface_side_mount	PLC					
	places_work_surface_slope_mount	PLC					
	series_950_credenza_file_work_surface_support	PLC			n/a NOT IN PHASE I	n/a NOT IN PHASE I	
					required when cantilever in the way - use in place: provides aft support, credenza provides fore support		

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## Relationship Maps (part 25 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From	C#	Relationships	Constraint		Light Weight	Relationships
							L#			
<b>Non-Panel Attached Brackets</b>										
	premise_work_surface_drop_mount	PRM								
	premise_work_surface_flush_mount	PRM								
	new_views_cabinet_to_work_surface_bracket	PLC					(brought in when NV Upper			
	places_work_surface_drop_mount	PLC					Dep Cabinet touches a WS)			
	places_work_surface_flush_mount	PLC					n/a			
<b>Legs</b>										
	premise_work_surface_support_leg	PRM					\$D\$312			
	places_work_surface_support_leg	PLC								
<b>Worksurface Support Panels</b>										
	premise_work_surface_support_panel	PRM								
	places_conference_end_support	PLC								
	places_work_surface_end_full_support_panel	PLC								
	places_work_surface_end_half_support_panel	PLC								
	places_work_surface_support_panel	PLC								

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## Relationship Maps (part 26 of 34)

Class Structure	Component Name	Prod Line	Proper-ties	From	C#	Inher-its	Constraint	Light Weight	
								L#	Relationships
Height Adjustment Kits					\$D\$312				
	premise_lateral_file_height_adjustment_kit	PRM							
	premise_pedestal_height_adjustment_kit	PRM							
	premise_storage_unit_height_adjustment_kit	PRM							
Adjustable Supports					\$D\$312				
	places_height_adjustable_corner_mechanism	PLC							

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## Relationship Maps (part 27 of 34)

			Inher- its		Constraint		Light Weight
Class Structure	Component Name	Prod Line	Proper- ties	From	C#	Relationships	L#
places_height_adjustable_rectangular_mechanism	PLC						
places_height_adjustable_split_corner_mechanism	PLC						
<u>Seating</u>							
<u>Auditorium Seating</u>							
<u>Adjustable Seating</u>							
	accolade_caster_base_chair	PLC					
	accolade_caster_base_stool	PLC					
	improv_caster_base_chair	PLC					
	improv_he_caster_base_chair	PLC					
<u>Stackable Seating</u>							
	improv_leg_base_stacking_chair	PLC					
<u>Non-Adjustable Seating</u>							
	accolade_sled_base_chair	PLC					
	improv_leg_base_stool	PLC					
	improv_sled_base_chair	PLC					
<u>Lounge Seating</u>							
<u>Benches</u>							
<u>Single Lounge Seating</u>							
<u>Multiple Lounge Seating</u>							
<u>Power and Data</u>							

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## Relationship Maps (part 28 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From	C#	Relationships	L#	Inher- its	Constraint	Light Weight	Relationships
Power and Data Providers					\$B\$366						
In-Feeds	premise_base_feed_module	PRM			\$C\$367						
	premise_top_feed_module	PRM									
	places_base_feed_module	PLC									
	places_top_feed_module	PLC									
Out-Feeds	premise_base_igr_receptacle	PRM			\$C\$367						
	premise_base_receptacle	PRM									
	premise_panel_communications_port_kit	PRM									
	premise_panel_power_port_kit	PRM									
	places_base_igr_receptacle	PLC									
	places_base_igr_surge_protector_receptacle	PLC									
	places_base_receptacle	PLC									
	places_smart_work_surface_power_module	PLC									
	places_switching_system_kit	PLC									
	places_switching_system_power_supply	PLC									

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## Relationship Maps (part 29 of 34)

Class Structure	Component Name	Prod Line	Inher-its	Constraint	Light Weight
		Proper ties	From	Relationships	L# Relationships
	places_switching_system_receptacle	PLC		n/a NOT IN PHASE I	n/a NOT IN PHASE I
	places_switching_system_wall_switch	PLC		n/a NOT IN PHASE I	n/a NOT IN PHASE I
	places_work_surface_duplex_receptacle	PLC		Goes on top of WS at click_x, click_z	
	places_work_surface_power_module	PLC		1 Requires a WS to sit on	1
<b>Power and Data Routers</b>			\$B\$366		
<b>Power and Data Channels</b>			\$C\$388		
	premise_vertical_wire_manager	PRM		n/a ACCESSORY	n/a ACCESSORY
	places_cable_management_post	PLC			
	places_horizontal_wire_manager_33in	PLC		n/a ACCESSORY	n/a ACCESSORY
	places_horizontal_wire_manager_40in	PLC		n/a ACCESSORY	n/a ACCESSORY
	places_variable_height_cable_management_post	PLC			
<b>Power and Data Connectors</b>			\$C\$388	Consume 1 left- and 1 right-hand power site <i>(used to span non-powered panels)</i>	
	premise_extended_power_connector	PRM			
	premise_flexible_power_connector	PRM		Consume 1 left- and 1 right-hand power site	
	premise_straight_span_power_connector	PRM		1	
	places_base_to_bellline_power_connector	PLC			
	places_bellline_to_bellline_power_connector	PLC			
	places_extended_power_connector	PLC			
	places_flexible_power_connector	PLC			
	places_straight_power_connector	PLC			
<b>Cable Management</b>			\$B\$366		
	premise_grommet	PRM			
	premise_wire_management_loop	PRM		n/a ACCESSORY	n/a ACCESSORY

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Relationship Maps (part 30 of 34)

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## Relationship Maps (part 31 of 34)

Class Structure	Component Name	Prod Line	Proper ties	Inher- its	Constraint	Relationships	L#	Light Weight	Relationships
	places_task_light	PLC			1 "HML plc-t!"				
<b>Vertically Mounted Lighting</b>				\$C\$416					
	places_grid_hung_pivot_head_task_light	PLC			n/a ACCESSORY				
	places_panel_hung_fluorescent_light	PLC			1 "Hang Stuff"				
	places_panel_hung_pivot_head_task_light	PLC			1 "Hang Stuff"				
	places_panel_mounted_fluorescent_light	PLC			1 "VML plc-pml!"				
	places_post_mount_street_light	PLC			Mounts powered panels >=18"				
	places_street_light	PLC			1 wide, <63" tall				
					"Mounts on Top of Panel" AND 1 Panel >= 63"				
<b>Floor Mounted Lighting</b>				\$C\$416	1 Must sit on floor		1		
<b>Lighting Accessories</b>				\$C\$416					
	places_fluorescent_light_saddle_mount_kit	PLC			Requires appropriate top-cap 1 (wood or metal)	??? * (instantiated by premise_shelf)			
	places_painted_shelf_task_light_bracket	PLC			??? * (instantiated by premise_shelf)	*** * (instantiated by premise_shelf)			
	places_vertical_storage_task_light_bracket	PLC							
	places_wood_shelf_task_light_bracket	PLC							
<b>Organization</b>				\$A\$3					
<b>Tackable Surfaces</b>				\$B\$437	1 "Tackables"		1 "Hang Stuff"		
	premise_lackboard	PRM	N			Inh			
	places_grid_tackstrip	PLC	N			n/a ACCESSORY			
	places_lackboard	PLC	N			Inh			
<b>Markable Surfaces</b>				\$B\$437	1 "Markables"		1 "Hang Stuff"		

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Relationship Maps (part 32 of 34)

Class Structure		Inher- its	Proper- ties		Constraint		Light Weight
		Component Name	Line	C#	Relationships	L#	Relationships
	premise_markerboard	PRM	N	Inh		Inh	
	places_markerboard	PLC	N	Inh		Inh	
Workflow Devices			\$B\$437				
Vertical Workflows			\$C\$445				
	premise_all_purpose_hook	PRM		n/a	ACCESSORY	n/a	ACCESSORY
	premise_lateral_file_compressor	PRM		n/a	ACCESSORY	n/a	ACCESSORY
	premise_lateral_file_drawer_divider	PRM		n/a	ACCESSORY	n/a	ACCESSORY
	premise_lateral_file_front_to_back_hanging_bar	PRM		n/a	ACCESSORY	n/a	ACCESSORY
	premise_lateral_file_side_to_side_hanging_bar	PRM		n/a	ACCESSORY	n/a	ACCESSORY
	premise_pedestal_drawer_divider	PRM		n/a	ACCESSORY	n/a	ACCESSORY
	premise_shelf_divider	PRM		n/a	ACCESSORY	n/a	ACCESSORY
	paper_management_bar_G_PRM			n/a	ACCESSORY	n/a	ACCESSORY
	paper_management_freestanding_vertical_unit_C_PRM			n/a	ACCESSORY	n/a	ACCESSORY
	paper_management_suspended_vertical_unit_C_PRM			n/a	ACCESSORY	n/a	ACCESSORY
	new_views_shelf_divider	PLC		n/a	ACCESSORY	n/a	ACCESSORY
	places_all_purpose_hook	PLC		n/a	ACCESSORY	n/a	ACCESSORY
	places_fundamental_pedestal_hanging_bar	PLC		n/a	ACCESSORY	n/a	ACCESSORY
	places_fundamental_pedestal_side_to_side_divider	PLC		n/a	ACCESSORY	n/a	ACCESSORY
	places_lateral_file_front_to_back_hanging_bar	PLC		n/a	ACCESSORY	n/a	ACCESSORY
	places_organization_grid	PLC					

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## Relationship Maps (part 33 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From	Inher- its	C#	Relationships	Constraint		Light Weight		Relationships
								L#				
	Places_shelf_divider	PLC					n/a ACCESSORY			n/a ACCESSORY		
	places_vertical_storage_unit_grid	PLC					n/a ACCESSORY			n/a ACCESSORY		
	tri_mode_paper_management_bar	PLC					n/a ACCESSORY			n/a ACCESSORY		
	tri_mode_vertical_unit	PLC					n/a ACCESSORY			n/a ACCESSORY		
	series_950_drawer_compressor	PLC					n/a ACCESSORY			n/a ACCESSORY		
	series_950_drawer_divider	PLC					n/a ACCESSORY			n/a ACCESSORY		
	series_950_front_to_back_hanging_bar	PLC					n/a ACCESSORY			n/a ACCESSORY		
	series_950_side_to_side_hanging_bar	PLC					n/a ACCESSORY			n/a ACCESSORY		
<b>Horizontal Workflows</b>												
	premise_pedestal_pencil_tray	PRM				\$C\$445						
	paper_management_freestanding_horizontal_unit	C, PRM					n/a ACCESSORY			n/a ACCESSORY		
	paper_management_suspended_horizontal_unit	C, PRM					n/a ACCESSORY			n/a ACCESSORY		
	paper_management_trays	C, PRM					n/a ACCESSORY			n/a ACCESSORY		
	paper_management_under_shelf_unit	PLC					n/a ACCESSORY			n/a ACCESSORY		
	places_freestanding_grid_mailbox	PLC					n/a ACCESSORY			n/a ACCESSORY		
	places_fundamental_pedestal_tray	PLC					n/a ACCESSORY			n/a ACCESSORY		
	places_grid_mailbox	PLC					n/a ACCESSORY			n/a ACCESSORY		
	places_grid_reference_tray	PLC					n/a ACCESSORY			n/a ACCESSORY		
	tri_mode_divider	PLC					n/a ACCESSORY			n/a ACCESSORY		
	tri_mode_hanger_clip	PLC					n/a ACCESSORY			n/a ACCESSORY		
	tri_mode_horizontal_sheaves	PLC					n/a ACCESSORY			n/a ACCESSORY		
	tri_mode_horizontal_unit	PLC					n/a ACCESSORY			n/a ACCESSORY		

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## Relationship Maps (part 34 of 34)

Class Structure	Component Name	Prod Line	Proper ties	From	C#	Relationships	L#	Constraint		Light Weight	
								Inher- its		Relationships	L#
<b>Diagonal Workflows</b>											
	paper_management_freestanding_diagonal_unit	C_PRM		\$CS445				n/a	ACCESSORY		n/a ACCESSORY
	paper_management_suspended_diagonal_unit	C_PRM						n/a	ACCESSORY		n/a ACCESSORY
	tri_mode_diagonal_unit	PLC						n/a	ACCESSORY		n/a ACCESSORY
<b>Workflow Bins</b>											
	places_grid_diskette_bin	PLC		\$CS445				n/a	ACCESSORY		n/a ACCESSORY
	places_grid_storage_bin	PLC						n/a	ACCESSORY		n/a ACCESSORY

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Although described with reference to a particular system, the present invention operates on any computer system and can be implemented in software, hardware or any combination thereof. When implemented fully or 5 partially in software, the invention can reside, permanently or temporarily, on any memory or storage medium, including but not limited to a RAM, a ROM, a disk, an ASIC, a PROM and the like.

Thus, a graphical user interface for configuring 10 office furniture is provided. One skilled in the art will appreciate that the present invention can be practiced by other than the described embodiments, which are presented for purposes of illustration and not limitation, and the present invention is limited 15 only by the claims that follow.

## What is claimed:

1           1. A method, for use in a user workstation  
2         including a pointing device and a visual display unit,  
3         for providing a graphical user interface to a computer  
4         program for configuring office furniture, the method  
5         comprising:

6                 displaying on a screen of the visual display unit  
7         at the user's workstation questions regarding user  
8         configuration criteria;

9                 in response to said displaying, obtaining  
10         configuration criteria from the user and providing the  
11         user configuration criteria to the computer program;

12                 displaying in an area on a screen of the visual  
13         display unit at the user's workstation a graphical  
14         representation of at least one typical furniture  
15         configuration satisfying the user configuration  
16         criteria;

17                 selecting, with the pointing device, a typical  
18         furniture configuration from the at least one typical  
19         furniture configuration displayed on the screen;

20                 modifying, using the pointing device, aspects of  
21         the selected typical furniture configuration to produce  
22         a modified furniture configuration;

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23           displaying on the visual display unit at the  
24        user's workstation a graphical representation of the  
25        modified furniture configuration;  
26           with the pointing device, selecting a validity  
27        checking option to effect checking the validity of the  
28        modified furniture configuration; and  
29           in response to said selecting the validity  
30        checking option, checking the validity of the modified  
31        configuration.

1           2. A method as in claim 1 wherein the  
2        configuration criteria include at least one of:  
3           conferencing criteria;  
4           privacy criteria;  
5           power criteria;  
6           communications criteria;  
7           storage criteria; and  
8           area criteria.

1           3. A method as in claim 1 wherein the modifying  
2        of the selected typical furniture configuration  
3        comprises at least one of, for a depicted component of  
4        the selected typical furniture configuration:  
5           adding another component to the depiction of the  
6        selected typical furniture configuration;

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7           deleting the depicted component from the depiction  
8        of selected typical furniture configuration;  
9           repositioning the depicted component of the  
10      depicted selected typical furniture configuration;  
11          changing the depicted fabric or finish of the  
12      depicted component of the depicted selected typical  
13      furniture configuration; and  
14          changing the shape or size of the depicted  
15      component of the depicted selected typical furniture  
16      configuration.

1           4. A method as in claim 3 wherein the adding of  
2        another component comprises:

3           on the screen of the visual display unit at the  
4        user's workstation, presenting the user with various  
5        possible components which can be added; and  
6           by the user,

7           selecting with the pointing device one of the  
8        various possible components; and  
9           on the display depicting the typical  
10      furniture configuration, positioning the  
11      selected one possible component on the  
12      depiction of the current typical furniture  
13      configuration.

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1        5. A method as in claim 3 wherein the changing  
2        the shape or size of the depicted component comprises,  
3        with the pointing device:

4              selecting the depicted component; and  
5              adjusting the shape or size of the depicted  
6        component, whereby the shape or size can only be  
7        adjusted to a valid shape or size.

1        6. A method as in claim 1 further comprising:  
2              with the pointing device, selecting a price option  
3        to effect determining a price of the modified  
4        configuration; and  
5              in response to said selecting said price option,  
6        determining a price of the modified depicted  
7        configuration.

1        7. A method as in claim 1 further comprising:  
2              with the pointing device, selecting a cluster  
3        option to effect producing a cluster configuration of  
4        the modified typical furniture configuration; and  
5              in response to said selecting said cluster option,  
6        producing a cluster configuration of the modified  
7        typical furniture configuration; and  
8              displaying on the screen of the visual display  
9        unit at the user's workstation a depiction of the  
10      cluster configuration.

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1        8. A method as in claim 7 further comprising:  
2              with the pointing device, selecting a price option  
3              to effect determining a price of the cluster  
4              configuration; and  
5              in response to said selecting said price option,  
6              determining the price of the cluster configuration.

1        9. A method as in claim 7 wherein the producing  
2              of a cluster comprises:  
3              determining if the cluster configuration is a  
4              valid configuration; and  
5              optimizing the cluster configuration.

1        10. A method as in claim 1 wherein the checking  
2              the validity of the modified configuration comprises  
3              optimizing the modified configuration.

1        11. A method as in claims 9 or 10 wherein the  
2              optimizing of a configuration comprises at least one  
3              of:  
4              removing redundant components from the  
5              configuration;  
6              merging components in the configuration; and  
7              splitting components in the configuration.

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1           12. A method as in claim 1 wherein the modifying  
2 aspects of the selected typical furniture configuration  
3 comprises modifying the entire product line of the  
4 configuration.

1           13. A method of configuring office furniture  
2 comprising, by computer:

3           obtaining configuration criteria from a user;  
4           presenting the user with at least one typical  
5 furniture configuration satisfying the criteria;  
6           selecting a typical furniture configuration from  
7 the at least one typical configuration;  
8           modifying aspects of the selected typical  
9 furniture configuration to produce a modified furniture  
10 configuration;  
11          producing a cluster configuration of the modified  
12 typical furniture configuration;  
13          checking the validity of the cluster  
14 configuration; and  
15          determining a price of the cluster configuration.

1           14. A method of configuring office furniture  
2 comprising, by computer:

3           obtaining configuration criteria from a user;  
4           presenting the user with at least one typical  
5 furniture configuration satisfying the criteria;

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6           selecting a typical furniture configuration from  
7         the at least one typical configuration;  
8           modifying aspects of the selected typical  
9         furniture configuration to produce a modified  
10      configuration; and  
11      checking the validity of the modified  
12      configuration.

1           15. A method as in claim 14 wherein the  
2         configuration criteria include at least one of:  
3           conferencing criteria;  
4           privacy criteria;  
5           power criteria;  
6           communications criteria;  
7           storage criteria; and  
8           area criteria.

1           16. A method as in claim 14 wherein the modifying  
2         of the selected typical comprises at least one of, for  
3         a component of the selected typical:  
4           adding another component to the selected typical  
5         furniture configuration;  
6           deleting the component from the selected typical  
7         furniture configuration;  
8           repositioning the component of the selected  
9         typical furniture configuration;

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10        changing the fabric or finish of the component of  
11        the selected typical furniture configuration; and  
12        changing the shape or size of the component of the  
13        selected typical furniture configuration.

1        17. A method as in claim 16 wherein the adding of  
2        another component comprises:

3            presenting the user with possible components which  
4        can be added; and  
5            by the user,  
6            selecting one of the possible components; and  
7            positioning the selected one possible  
8        component on the current typical furniture  
9        configuration.

1        18. A method as in claim 16 wherein the changing  
2        the shape or size of the component comprises:

3            selecting the component; and  
4            adjusting the shape or size of the component,  
5        whereby the shape or size can only be adjusted to a  
6        valid shape or size.

1        19. A method as in claim 14 further comprising:  
2            determining a price of the modified furniture  
3        configuration.

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1        20. A method as in claim 14 further comprising:  
2            producing a cluster configuration of the modified  
3            typical furniture configuration.

1        21. A method as in claim 20 further comprising:  
2            determining a price of the cluster configuration.

1        22. A method as in claim 20 wherein the producing  
2            of a cluster comprises:  
3            determining if the cluster configuration is a  
4            valid configuration;  
5            optimizing the cluster configuration.

1        23. A method as in claim 14 wherein the  
2            checking the validity of the modified furniture  
3            configuration comprises  
4            optimizing the modified furniture configuration.

1        24. A method as in any one of claims 22 and 23  
2            wherein the optimizing of a configuration comprises at  
3            least one of:  
4            removing redundant components from the  
5            configuration;  
6            merging components in the configuration; and  
7            splitting components in the configuration.

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1        25. A method as in claim 14 wherein the modifying  
2        aspects of the selected typical comprises modifying the  
3        entire product line of the configuration.

1        26. Computer-readable media tangibly embodying an  
2        interface program of instructions executable by the  
3        machine to provide a graphical user interface to a  
4        computer program for configuring office furniture, the  
5        interface program comprising code to effect:

6              displaying on a screen of a visual display unit at  
7        a user's workstation questions regarding user  
8        configuration criteria;

9              in response to said displaying, obtaining  
10      configuration criteria from the user;

11             displaying in an area on a screen of the visual  
12      display unit at the user's workstation a graphical  
13      representation of at least one typical furniture  
14      configuration satisfying the criteria;

15             selecting, with input from the pointing device, a  
16      typical furniture configuration from the at least one  
17      typical furniture configurations displayed on the  
18      screen;

19             modifying, using input from the pointing device,  
20      aspects of the selected typical furniture configuration  
21      to produce a modified furniture configuration;

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22           displaying on the visual display unit at the  
23           user's workstation a graphical representation of the  
24           modified furniture configuration;  
25           with input from the pointing device, selecting a  
26           validity checking option to effect checking the  
27           validity of the modified furniture configuration; and  
28           in response to said selecting the validity  
29           checking option, checking the validity of the modified  
30           furniture configuration.

1           27. Media as in claim 26 wherein the  
2           configuration criteria include at least one of:  
3           conferencing criteria;  
4           privacy criteria;  
5           power criteria;  
6           communications criteria;  
7           storage criteria; and  
8           area criteria.

1           28. Media as in claim 26 wherein the modifying of  
2           the selected typical comprises at least one of, for a  
3           depicted component of the selected typical furniture  
4           configuration:  
5           adding another component to the depiction of the  
6           selected typical furniture configuration;

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7        deleting the depicted component from the depiction  
8        of selected typical furniture configuration;  
9        repositioning the depicted component of the  
10      depicted selected typical furniture configuration;  
11      changing the depicted fabric or finish of the  
12      depicted component of the depicted selected typical  
13      furniture configuration; and  
14      changing the shape or size of the depicted  
15      component of the depicted selected typical furniture  
16      configuration.

1            29. Media as in claim 28 wherein the adding of  
2        another component comprises:

3            on the screen of the visual display unit at the  
4        user's workstation, presenting the user with various  
5        possible components which can be added; and  
6        by the user,

7            selecting with the pointing device one of the  
8        various possible components; and  
9        on the display depicting the typical  
10      furniture configuration, positioning the  
11      selected one possible component on the  
12      depiction of the current typical furniture  
13      configuration.

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1           30. Media as in claim 28 wherein the changing the  
2         shape or size of the depicted component comprises, with  
3         input from the pointing device:

4                 selecting the depicted component; and  
5                 adjusting the shape or size of the depicted  
6         component, whereby the shape or size can only be  
7         adjusted to a valid shape or size.

1           31. Media as in claim 26 the program further  
2         comprising code to effect:

3                 with input from the pointing device, selecting a  
4         price option to effect determining a price of the  
5         modified configuration; and  
6                 in response to said selecting said price option,  
7         determining a price of the modified depicted  
8         configuration.

1           32. Media as in claim 26 the program further  
2         comprising code to effect:

3                 with input from the pointing device, selecting a  
4         cluster option to effect producing a cluster  
5         configuration of the modified typical furniture  
6         configuration;

7                 in response to said selecting said cluster option,  
8         producing a cluster configuration of the modified  
9         typical furniture configuration; and

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10 displaying on the screen of the visual display  
11 unit at the user's workstation a depiction of the  
12 cluster configuration.

1 33. Media as in claim 32, the program further  
2 comprising code to effect:

3 with input from the pointing device, selecting a  
4 price option to effect determining a price of the  
5 modified configuration; and

6 in response to said selecting said price option,  
7 determining the price of the cluster configuration.

1 34. Media as in claim 32 wherein the producing of  
2 a cluster comprises:

3 determining if the cluster configuration is a  
4 valid furniture configuration; and  
5 optimizing the cluster configuration.

1 35. Media as in claim 26 wherein the checking the  
2 validity of the modified configuration comprises  
3 optimizing the modified configuration.

1 36. Media as in claim 35 wherein the optimizing  
2 of a configuration comprises at least one of:  
3 removing redundant components from the  
4 configuration;

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5 merging components in the configuration; and  
6 splitting components in the configuration.

1 37. Media as in claim 34 wherein the optimizing  
2 of a configuration comprises at least one of:

3 removing redundant components from the  
4 configuration;

5 merging components in the configuration; and  
6 splitting components in the configuration.

1 38. Media as in claim 26 wherein the modifying  
2 aspects of the selected typical comprises modifying the  
3 entire product line of the configuration.

1 39. Computer-readable media as in any one of  
2 claims 26 to 38 wherein said media comprise at least  
3 one of a RAM, a ROM, a disk, an ASIC and a PROM.

1 40. A computer-assisted furniture configuration  
2 system comprising:

3 (A) a visual display unit;

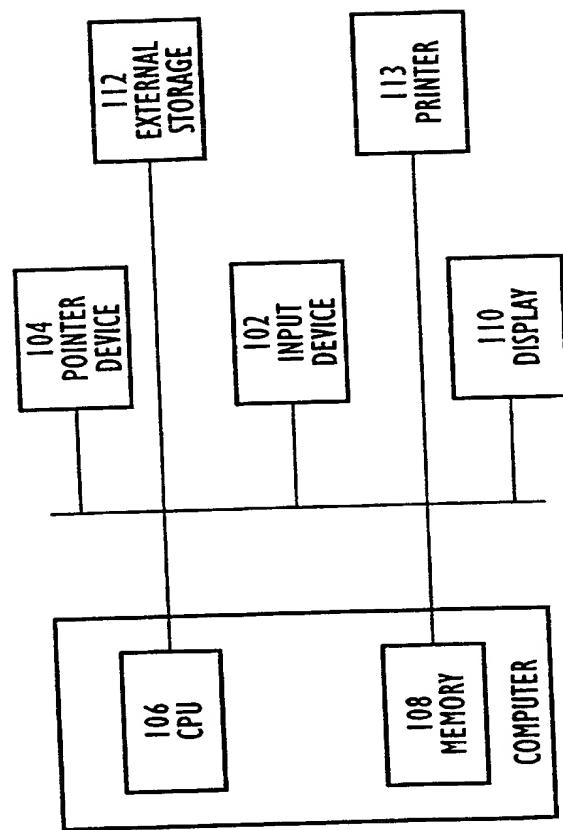
4 (B) a pointing device; and

5 (C) interface means for providing a graphical  
6 user interface to said configuration system, the  
7 interface means comprising means to effect:

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8        displaying on a screen of the visual display unit  
9        at the user's workstation questions regarding user  
10      configuration criteria;  
11        in response to said displaying, obtaining  
12      configuration criteria from the user and providing the  
13      user configuration criteria to the computer program;  
14        displaying in an area on a screen of the visual  
15      display unit at the user's workstation a graphical  
16      representation of at least one typical furniture  
17      configuration satisfying the user configuration  
18      criteria;  
19        selecting, with the pointing device, a typical  
20      furniture configuration from the at least one typical  
21      furniture configurations displayed on the screen;  
22        modifying, using the pointing device, aspects of  
23      the selected typical furniture configuration to produce  
24      a modified furniture configuration;  
25        displaying on the visual display unit at the  
26      user's workstation a graphical representation of the  
27      modified furniture configuration;  
28        with the pointing device, selecting a validity  
29      checking option to effect checking the validity of the  
30      modified furniture configuration; and  
31        in response to said selecting the validity  
32      checking option, checking the validity of the modified  
33      configuration.

FIG. 1



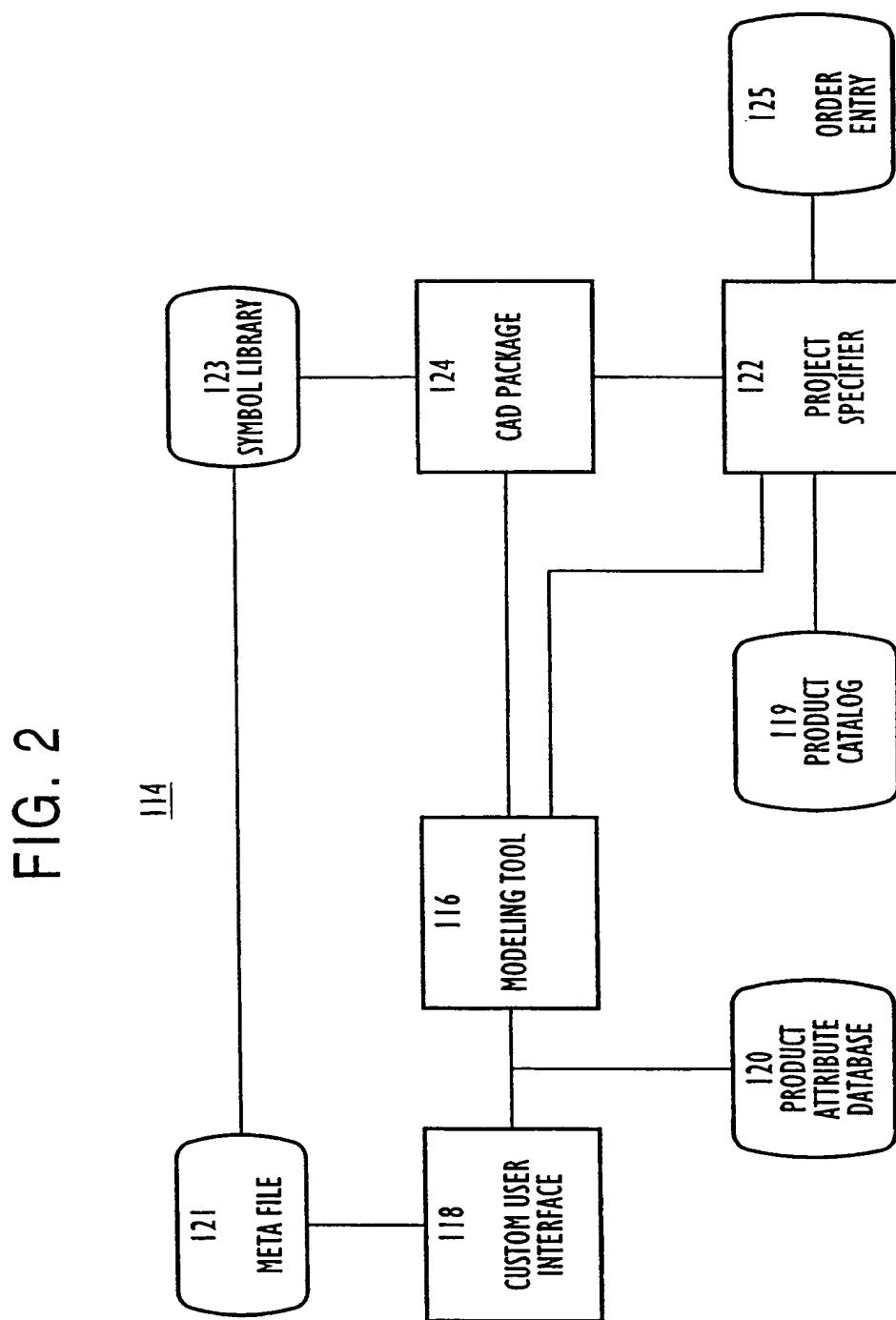


FIG. 3

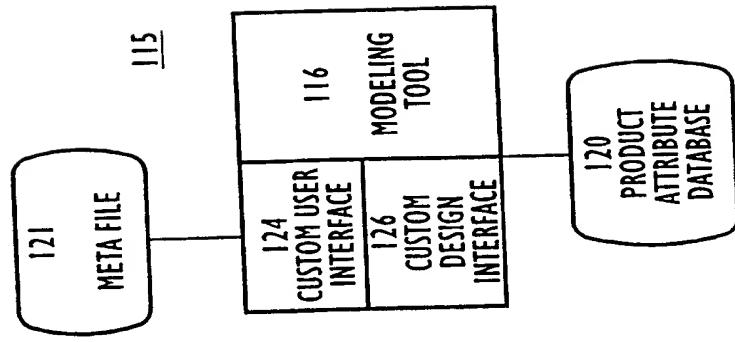
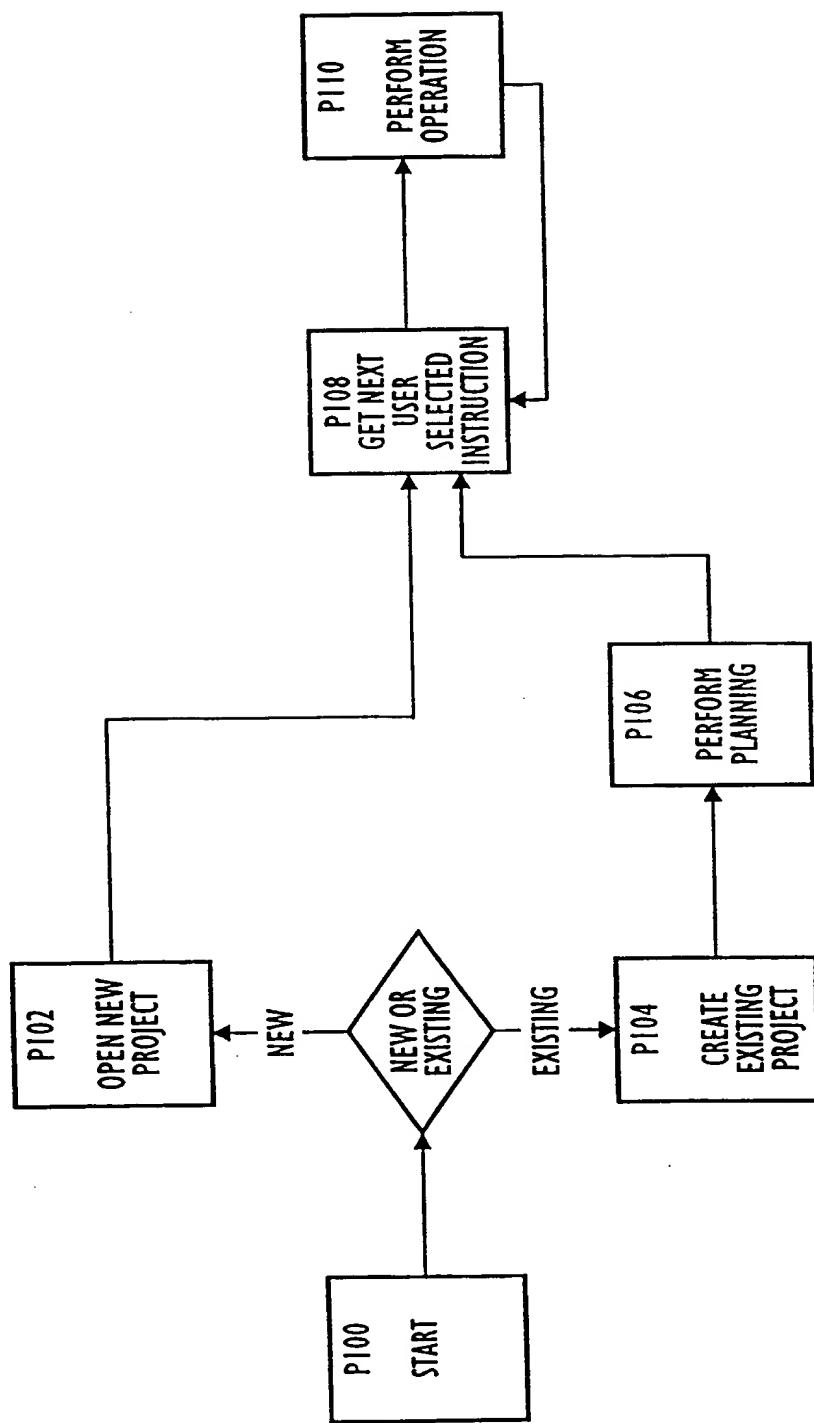
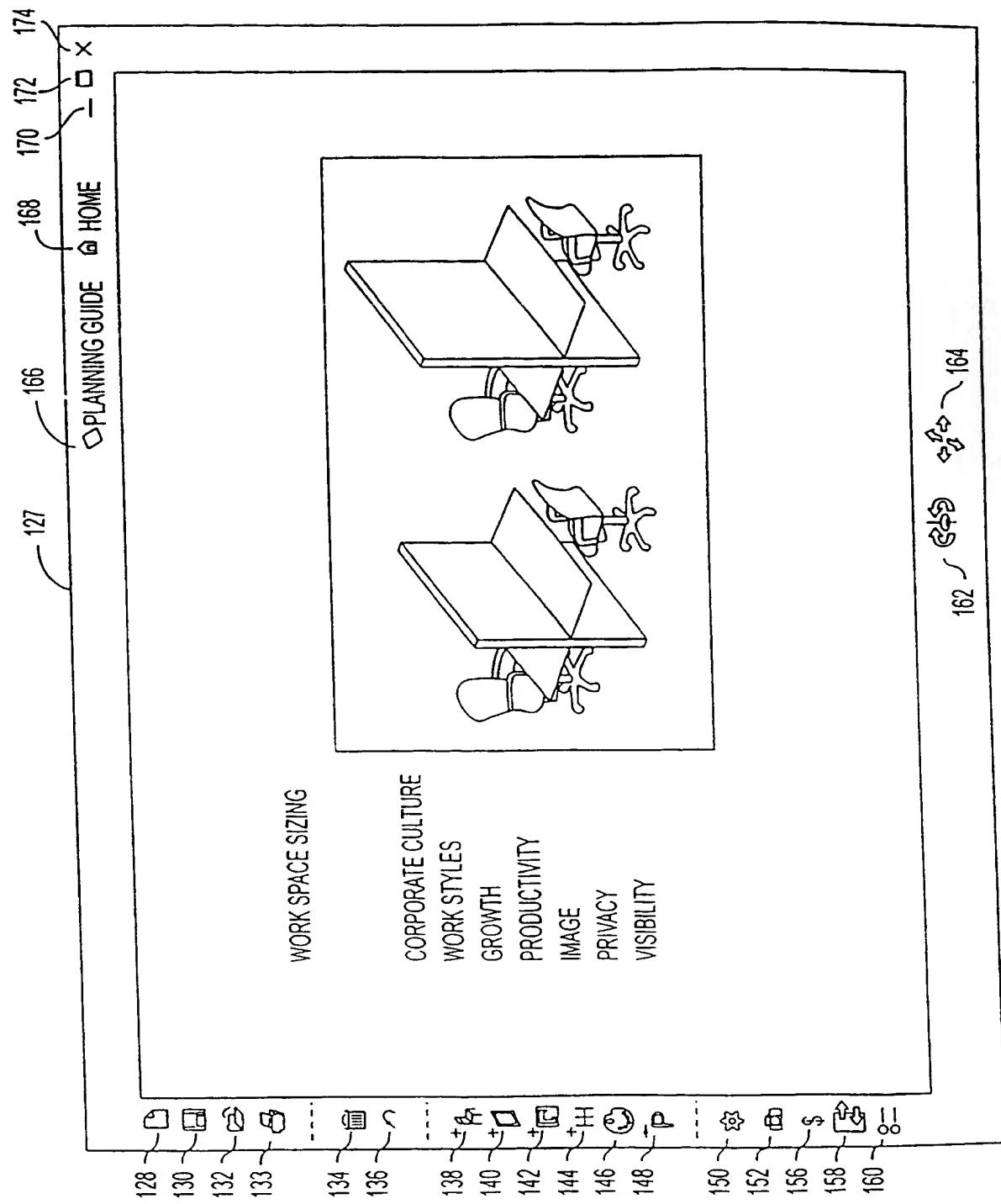


FIG. 4



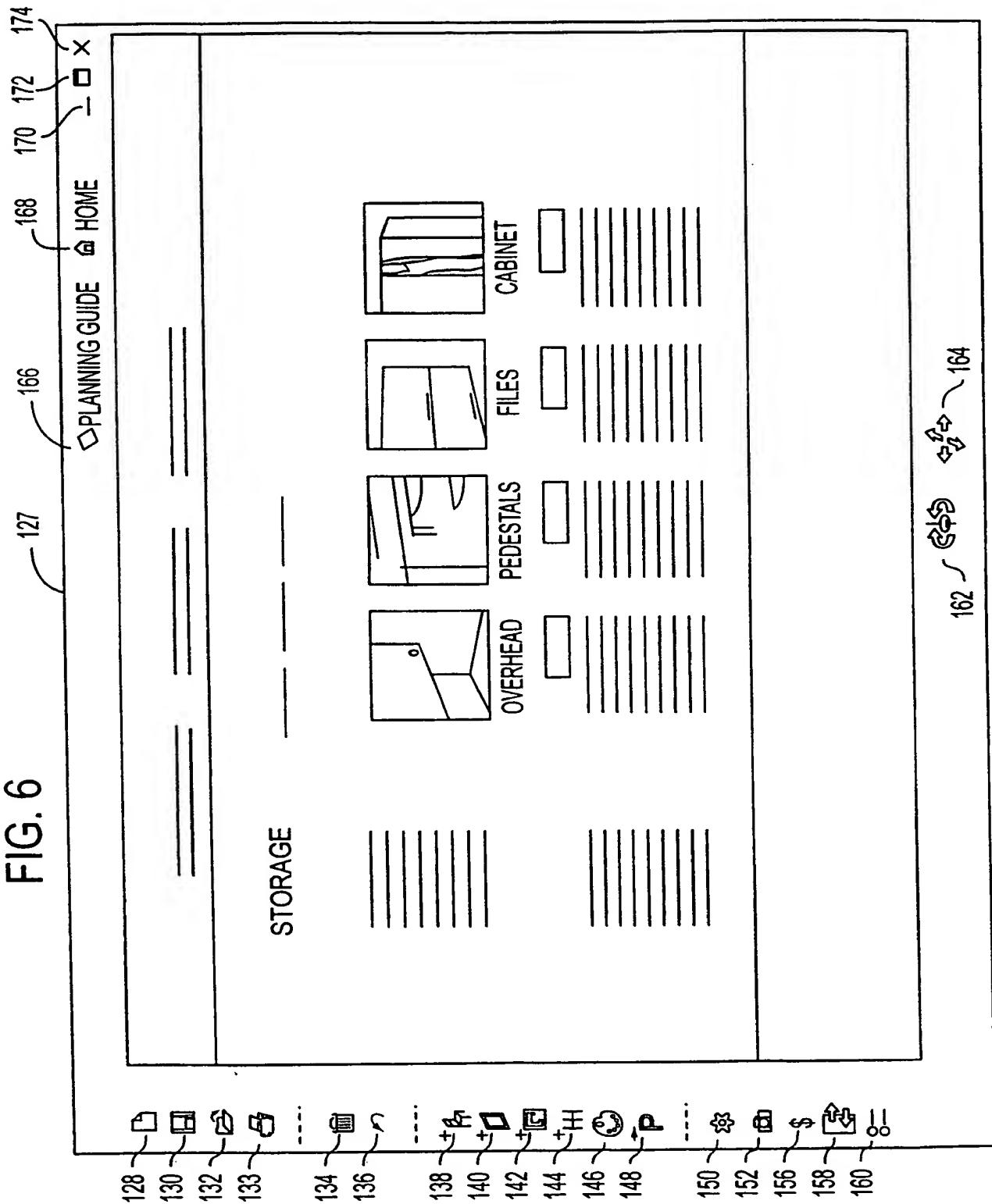
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FIG. 5



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FIG. 6



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FIG. 7

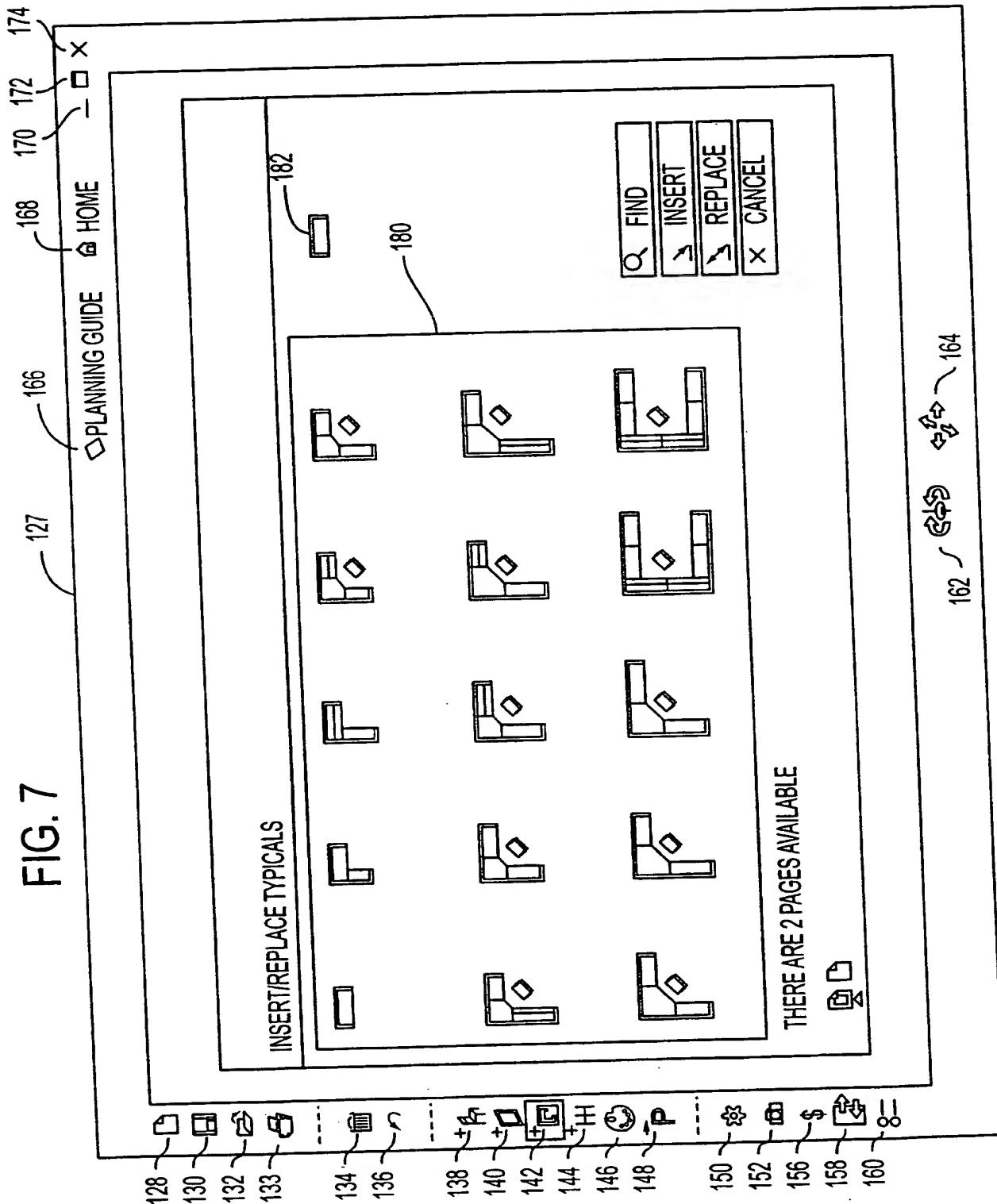


FIG. 8

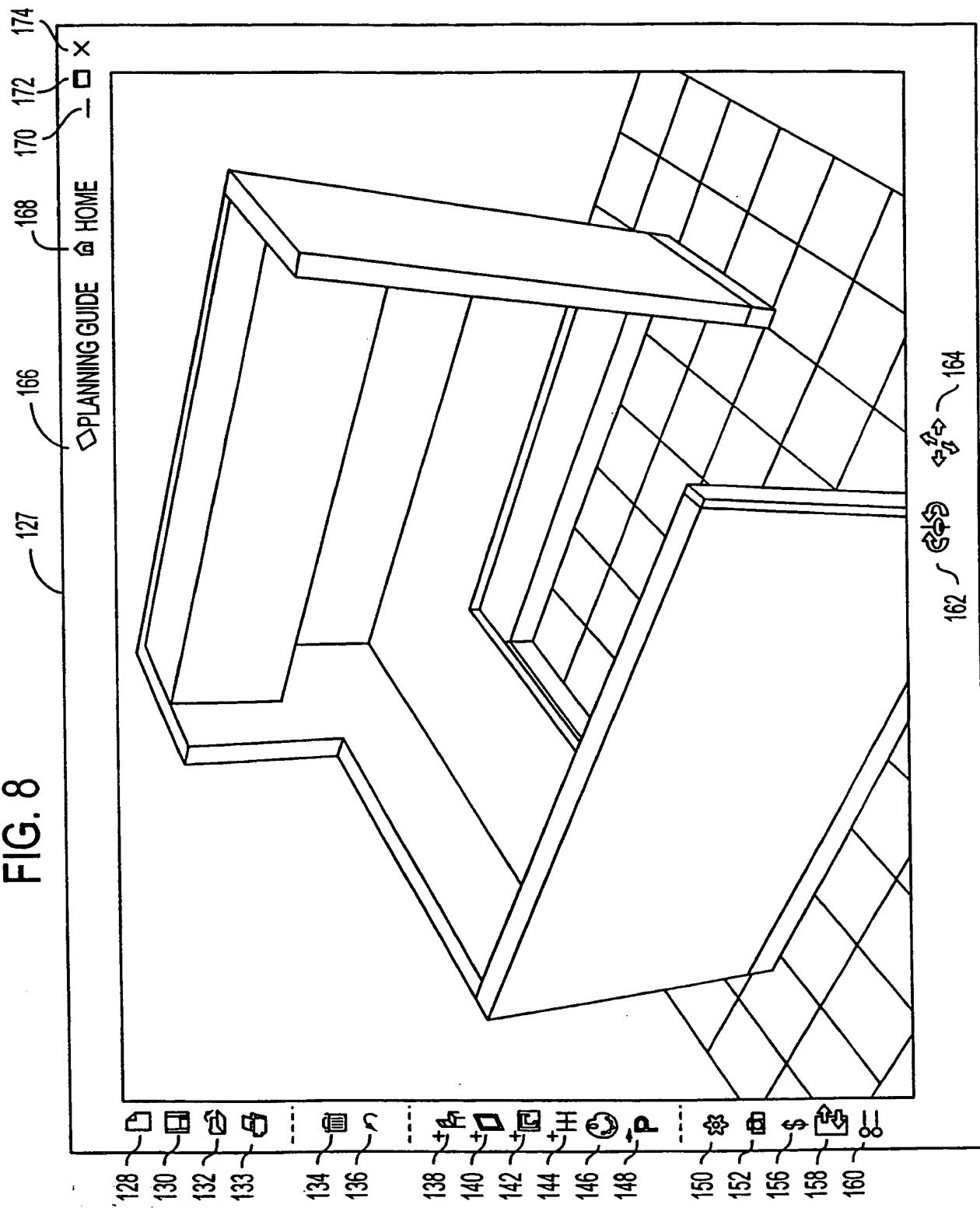


FIG. 9

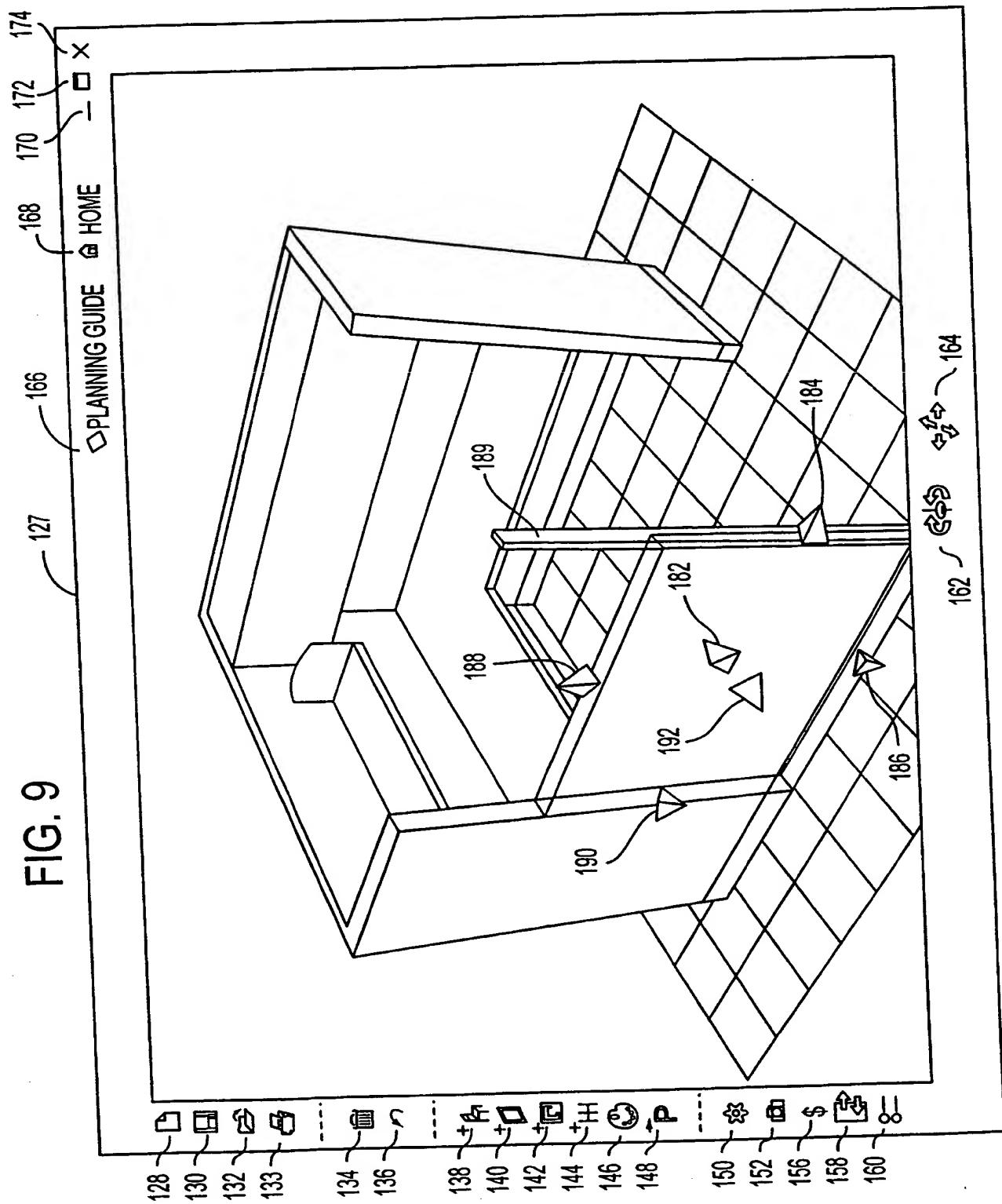
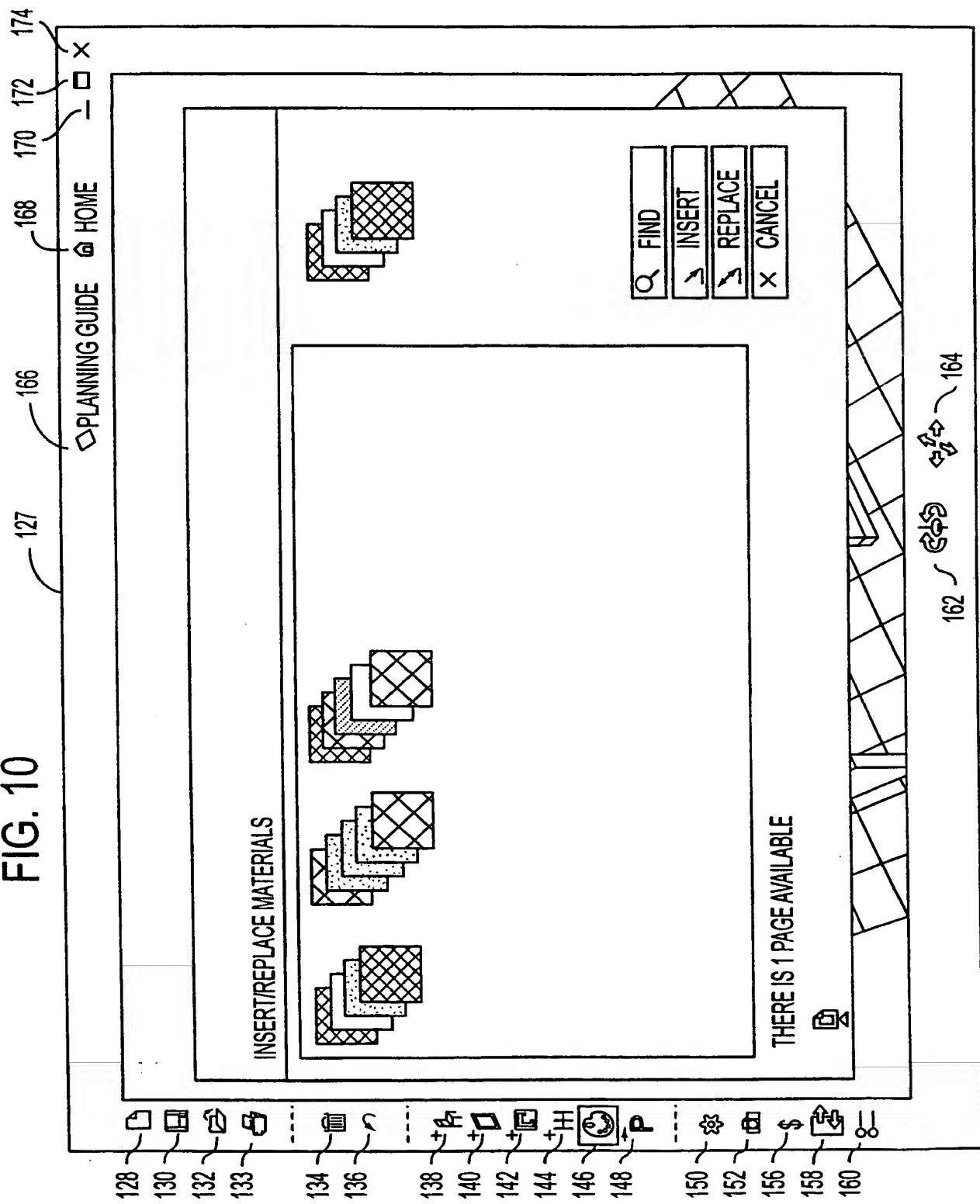
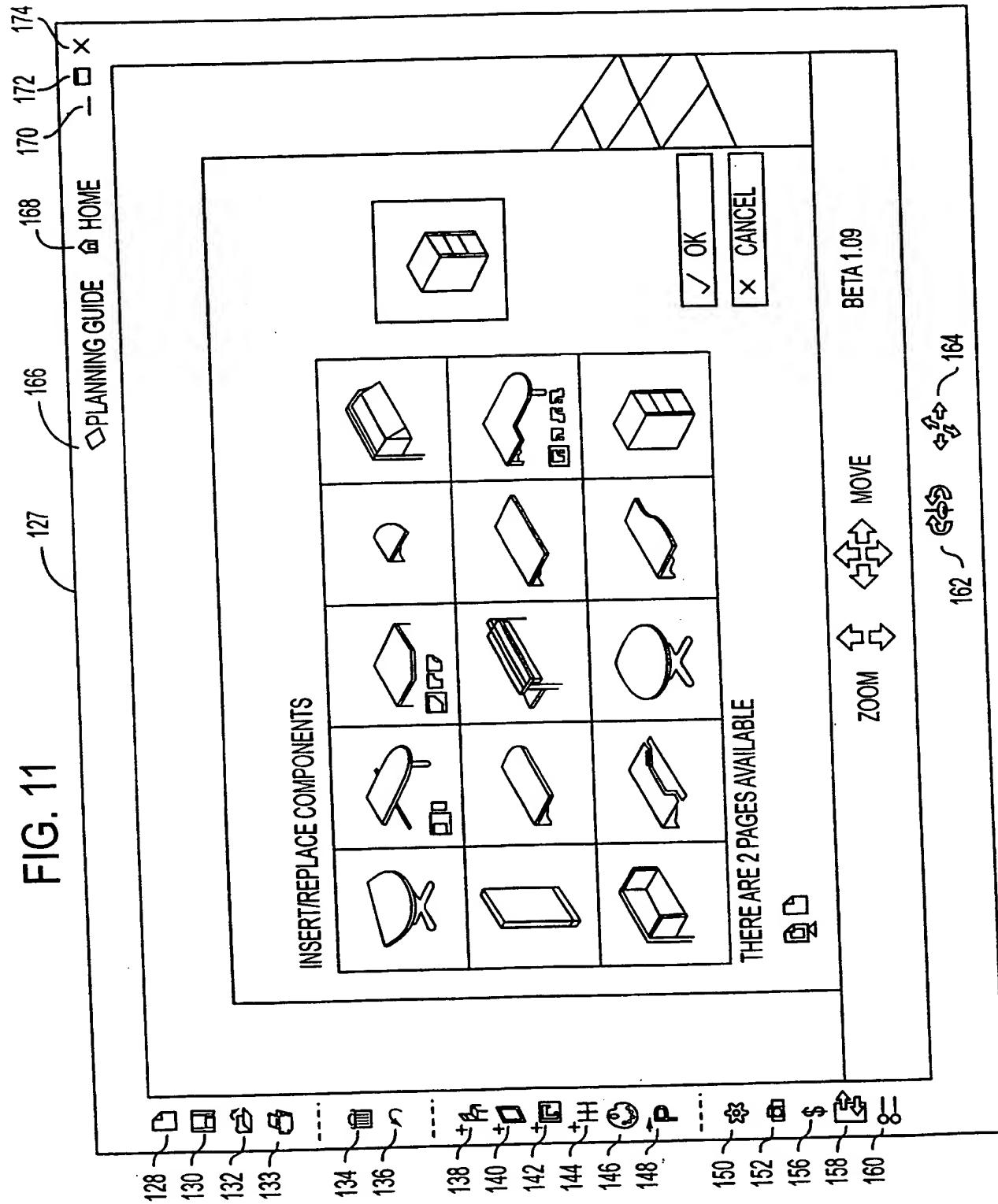


FIG. 10



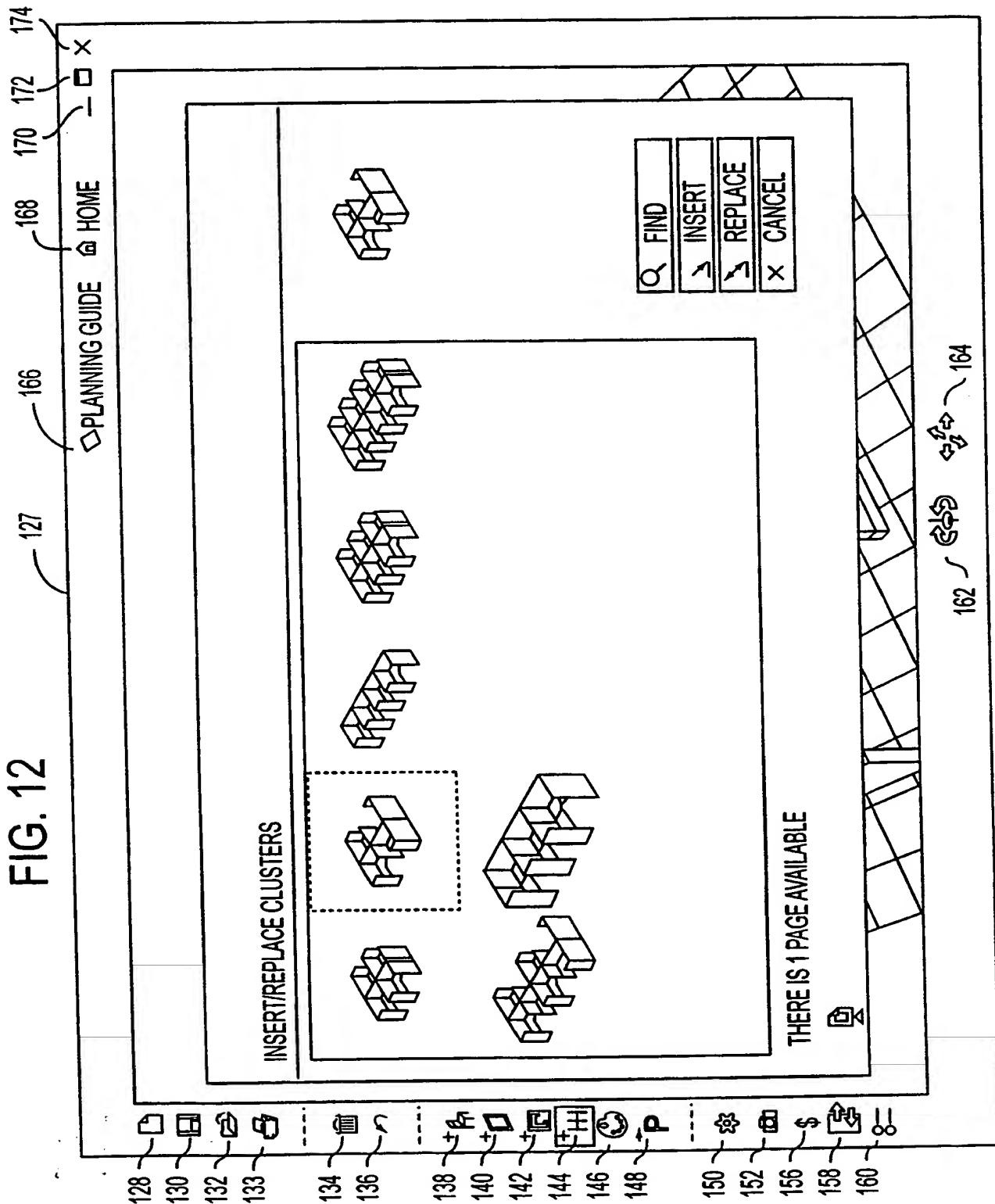
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FIG. 11



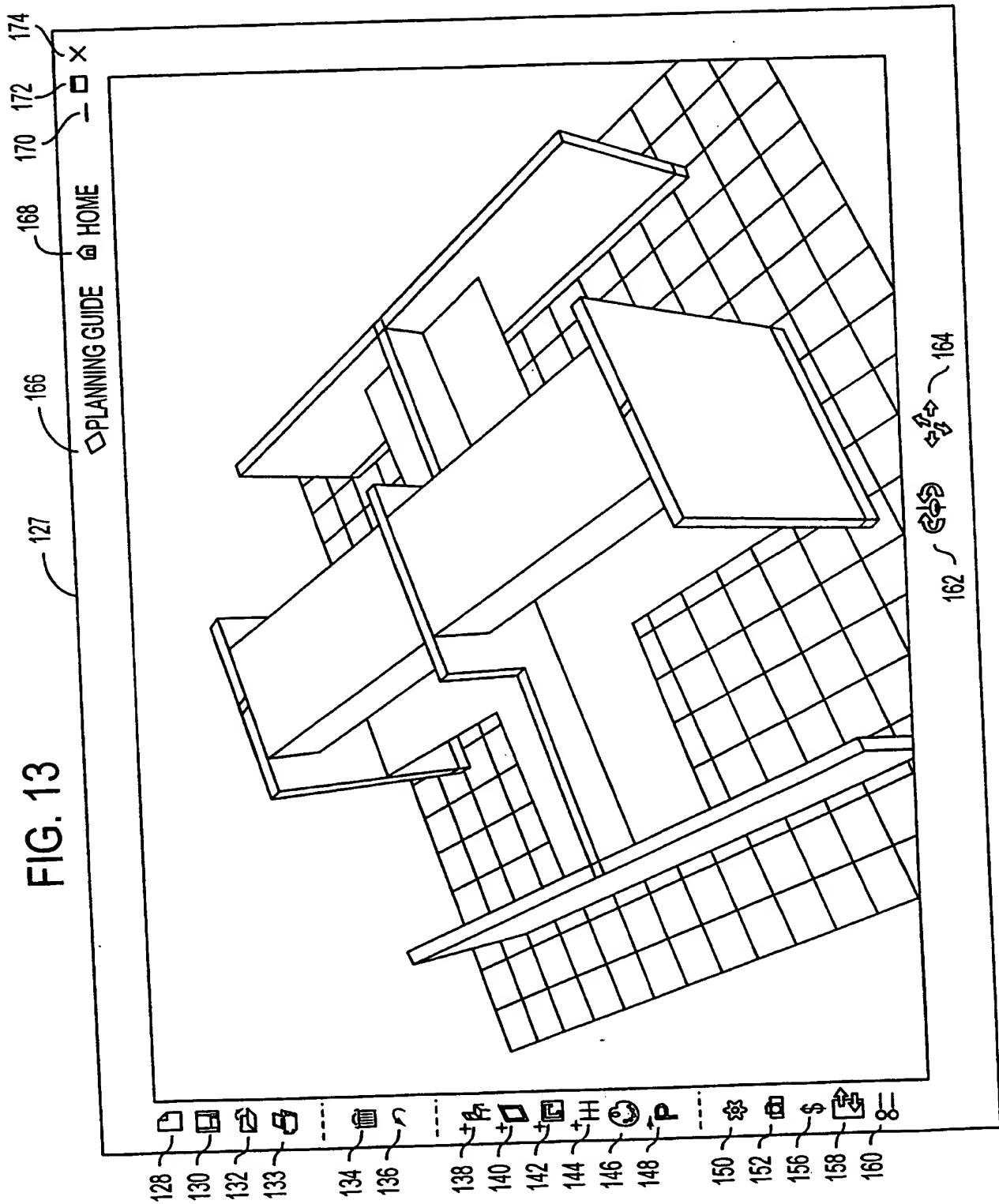
12/15

FIG. 12



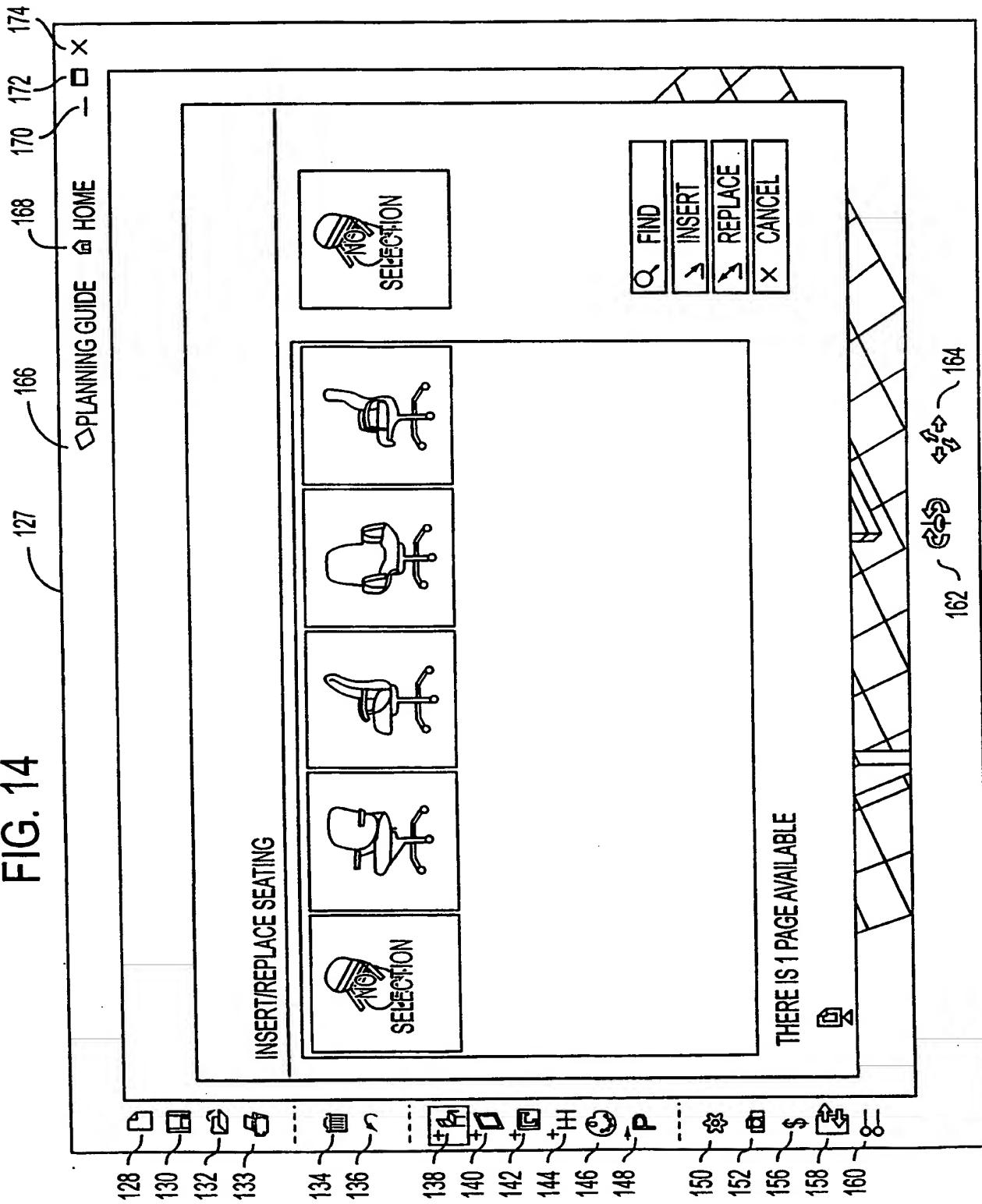
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FIG. 13



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FIG. 14



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FIG. 15

# INTERNATIONAL SEARCH REPORT

International Application No

PCT/US 98/09890

**A. CLASSIFICATION OF SUBJECT MATTER**  
 IPC 6 G06F17/50 G06T17/40 G06F17/60

According to International Patent Classification(IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
 IPC 6 G06F G06T

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 111 392 A (MALIN STUART B) 5 May 1992 see abstract; claims 1-9 see column 3, line 1 - line 17 see column 1, line 52 - column 2, line 34 see column 3, line 39 - line 60; figure 4 see column 5, line 10 - line 33; figures 1,9 -----	1-40
X	US 5 293 479 A (SMITH JIM ET AL) 8 March 1994 see abstract see column 2, line 7 - line 44 see column 3, line 21 - line 28 see column 9, line 37 - column 10, line 15; figure 1 -----	1,13,14, 26,40

Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of mailing of the international search report

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20/08/1998

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European Patent Office, P.B. 5818 Patentiaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.  
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Suendermann, R

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International Application No

PCT/US 98/09890

Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US 5111392	A 05-05-1992	NONE		
US 5293479	A 08-03-1994	AU 2309792 A		11-02-1993
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		EP 0598748 A		01-06-1994
		WO 9301557 A		21-01-1993